

BRITISH TELECOM's new chairman George Jefferson last week echoed the fear of his predecessor Sir William Barlow, that borrowing limits imposed by the government on BT would retard the UK's progress in telecommunications.

Our telephone network was among the most antiquated in Europe because successive governments had failed to allow investment in it, he told the Business Equipment Trade Association. Last year investment was equivalent to £18 per head of population, compared with £51 in France, £36 in the US, £32 in Japan and £30 in West Germany.

GEC, one of Britain's largest and richest companies, has launched a private videotext system with the claim that it stemmed from a prototype produced even before the BBC announced its Ceefax teletext system plans in 1972.

Introducing the GEC Videotext 4000 system and a videotext bureau service, technical director Sir Robert Claydon failed to explain why the company had taken so long to market its product.

Sir Robert said that GEC had played a major role in the development of both teletext and videotext. It had helped to unify standards and persuaded British Telecom to adopt the same standards for Prestel, launched in March 1979.

GEC had produced black and white teletext receivers in 1972 and colour ones two years later. By

Logica

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Europe technique is expected to be manufacturing memories in particular. National's 2147 4K static RAM, microprocessors and telecommunications chips using MOS technology at a rate of 5,000 circuits a month in 1981 and 50,000 circuits a month by 1985. According to M. Jean-Luc Grand-Clement, the company chairman, the joint venture will break even in 1982 and generate profits the year after.

His two main objectives are to capture 6% of the European market for MOS chips by 1984 and to build up exports within Europe.

Tesco has ordered £5 million worth of equipment for 15 of its largest stores, including 600 IBM 3683 terminals plus Case 9,600 bps rapid poll modems.

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COST saving from volume production is the reason given by Quest Automation for a reduction in the price of its Micropad handprint data entry terminal from £1,725 to £1,295.

A question mark was raised over the future of CPP UK early this year when Boole and Babbage took over marketing of its own software products, and Applied Data Research extracted an agreement handing over UK marketing of ADR packages by the end of 1981. The handover process was accelerated when CAP-CPP started talking to prospective buyers for CPP and has culminated in an announcement by ADR that nine people from CPP who sold ADR products will be joining ADR's UK operation on January 1.

INTERACTIVE computing facilities at Oxford were cut back dramatically this week because of drastic overloading on the University's ICL 2980, the machine originally considered more than adequate to run the service. A replacement service based on three Digital Equipment VAX machines ordered by the University is expected to start in early spring, and only then on a limited basis. Interactive users were told at a special users meeting last week that the use of MAC on the 2980 would be restricted from Monday, December 8, to program editing and shell APL and Fortran compilations. All other work would be consigned to batch queues and any user found breaking these restrictions would immediately be barred from using the service.

The number of terminals supported by the reduced interactive service during the day will be limited to 30 compared with 40 previously.

Users were told that a move to VME/B version 53X7 might allow more MAC virtual machines, although this was considered far from certain. Suggestions by users that Edinburgh University's Bmas interactive operating system should be adopted were rejected.

The first gallium arsenide-based linear integrated circuit will be produced commercially by Siemens next month.

Designated CGY 21, the device is an amplifier with a 0.04 to 1GHz frequency range and is intended for use in CATV receivers, certain professional and military applications and future satellite receivers.

Laboratories all over the world have been researching the technology but only small quantities of military and telecom spec devices have been released to date and gen-

eral purpose spec devices have not been available commercially.

CGY 21 is composed of two amplification stages using field effect technology. The input transistor has an original feature in its gate terminal, subdivided into six parallel sub-gates, each 150 microns thick.

Siemens predicts that integration levels will increase in the future as they did for silicon-based integrated circuits. By the end of 1981, Siemens' hopes to have an amplifier functioning at up to:

● **Turn to back page**

Computerview on funding	2	Micro News	11
Letters to the Editor	3	Op Spot	12
Finnish mini for sale	4	Programme page	13
Free French stacks	5	Puzzler	14
Downtime by Châd	6	People and Events	15
Mihle's Privateview	7	Company	16
Christmas Focus	8	Data Analysis - Part II	18
Right-to-know policy	9	Toys for Christmas	17
Univado extends V.77 range	7	Product News	16
Software File	10	Standardised software	19
		Brinknews for the novice	10

Job opportunities: Pages 22-39

A CO-OPERATIVE scheme to develop image recognition capability for robots has been set up by the Science Research Council and GEC Hurst Research Centre. The work will be carried out at Edinburgh University using a Clip 4 array processor. SRC funding will be £80,000 over three years and GEC will contribute rather more in cash or technical assistance.

A VIEWDATA adaptor designed to sell for under £200 is to be marketed by London-based Zycor. Called Telecdk 2000, the adaptor was designed around the NatSem SC/MP microprocessor by J Hempsstead Associates, and received British Telecom approval in May. A production agreement has been concluded with Sheffield-based manufacturer Greendale Electronics.

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COMPUTERVIEW

IF the ways of gods and men are, as the Irish
put it, strange indeed, there is even more
confusion about government funding for the
computer industry.The National Enterprise Board, the public
body with most experience and most
funds invested in the computer industry,
has lost most of its board of management in
a series of well-publicised resignations over
the past two weeks.A similar exodus from any private com-
pany handling the same level of investment
would have caused major upheavals in the
Stock Exchange and the withdrawal of back-
ers.Although the NEB's handling of the Fer-
ranti and ICL rescue operations was com-
petently done, and the eventual sales of share
stakes acquired in those two companies re-
sulted in £50 million profits, the resigna-
tions will augment already grave doubts
about the NEB's future in any public fund-
ing policy.The NEB announced recently an initial £2
million investment (from its proposed £25
million pool) in a joint venture capital com-
pany to be run by Jack Melchor, a successful
venture financier from the United States.Some confusion has arisen over Melchor's
role. It is primarily to find an American

No Irish joke

technology which can be brought to the UK
and manufactured here. (The role of finding
regional companies and providing them with
British "seedcorn" investment is allocated
to the NEB's Manchester office.)This £2 million sum is surely far too little
too late, and is being directed at the
wrong people. It is too little because the sum
is a drop in the ocean compared to the £120
million put into the Very Large Scale Inte-
grated Circuit project by the Japanese -
£55 million from government sources. And
£2 million is minuscule compared to the £50
million the Japanese have since put into the
related Software Development Project.It is too late when set against the £4 mil-
lion taken back from the National Research
and Development Council in taxes earlier
this year.But why is NEB money also being spent
on American ideas? There are plenty of po-
tentially lucrative British projects in search
of money. To go to California in the mannerof the NEB is to show conclusively that
there is no British computer industry invest-
ment policy, only a series of impromptu
reactions.If the points needs reinforcing, listen to
the National Enterprise Development
Office's comments on the lack of a British
policy for the microelectronic industry (see
page 10).What we have are five public or institution-
al bodies - the National Research and
Development Corp, Finance For Industry,
the NEB, the Industrial and Commercial
Finance Corporation and the Department of
Industry. Add to these any number of other
quasi-government agencies offering finance
to would-be industrialists, stir in some
muddled thinking at the top, and it is any
wonder that home-grown British ideas bring
home-grown employment so rarely?The major difference between Eire and
the UK in all this is a body called the Indus-
trial Development Authority. In the Repub-lic, they have a single body, operating
within a well-defined policy, which does
with both inbound investment and local
entrepreneurs.There is a 10-year tax holiday on export
for an approved project in the com-
puter manufacturing area. Software products are
treated similarly, though the EEC Com-
mission has forced 10% tax to apply from next
year.In addition, the Irish or foreign en-
trepreneur pays no personal tax on profits from
the project where job creation and export
are involved.While the UK regional development
authorities offer similar incentives, though on a
far less generous scale, they lack the clarity
about policy objectives which characterises
the Irish effort.It is wrong also to dismiss Ireland's suc-
cess with disparaging comments about
cheap labour. Irish labour costs are not
higher than those in the UK, and productiv-
ity gains from the new technology installed
under the generous grant incentives offered
by the IDA attracts much overseas money,
particularly American.Without a plan or a discernible policy,
confusion is the only name to give policy
funding of the UK computing industry.

LETTERS to the EDITOR

Programmer's
ideas for a
new languageIn Focus of November 27 you
mention the needs for a new pro-
gramming language project and
the lack of enthusiasm with which
Ada has so far been greeted by DP
in general, as have several other
State-of-the-art languages.Do you think part of the prob-
lem is that most languages are
created either by academics, who
are mainly concerned with com-
prehensiveness and soundness of
structure, or by professional DP
men, who are more interested in
practical applicability and ease of
use? I don't see how we can hope
to have a good up-to-date com-
mercial DP language until the two
sides get together in some sort of
forum where their ideas could be
pooled.I wondered whether you would
think it worthwhile to put forwardthis idea in your columns and
invite both academics and com-
mercial programmers to submit
their ideas about how such a forum
could be set up and what features
the language to be designed might
contain.They say every programmer
thinks he could design his own
language. I don't, because I'm not
an academic and I wouldn't know
how to make it watertight. Like
other programmers, however, I do
have some vague and unorganised
ideas about what I'd like to see in
the new language. I have outlined
these below. I could provide a
more detailed account to act as an
Aunt Sally for my colleagues and
thus start the ball rolling.

(name and address supplied)

OUTLINE SUGGESTIONS FOR
A NEW COMMERCIAL
DP PROGRAMMING LANGUAGETHESE ideas are not put forward as new or original, nor as precise specifica-
tions, but as features that practising programmers might find useful.In what follows, programmer-defined names are in upper case and keywords
in lower case, though no precise syntax is intended.The language would be applicable and would be used to write a system
rather than individual programs. Each statement would be a definition of the
form: X means Y.A possible classification of statement types would be:
1. Data type definitions (cf. Pascal).
a) Primary data (raw). Manually input into the system.
i) Elementary items.
ii) MONTH means integer, range 1-12.
b) Data structures.
c) "DATE means DAY, MONTH, YEAR".2. Derived data. Computed and output from system. An "IF" feature would be
provided here."TAX means GROSS * 0.3".
"NET means GROSS - TAX".
"GROSS means TAX * 1.3".3. Operational definitions. Used to provide new operators.
"SUBTRACT means less than 0".
"MOD means X DIV Y where the user having defined the function,
could then use it in his programs substituting any variables for X and Y."From a set of such statements a "compiler" would generate validation and
update software, perhaps interactive, to maintain a system database, and a copy-
right and query facility to "harvest" that database. Much of this could be pro-
grammed to be user-friendly, with the programmer doing the "hard" bits.Twelve pertinent questions
for would-be purchasersYOU have outlined the plight of a
Mr Randall who has encountered
difficulties during the acquisition
of a Burroughs B80 machine (CW,
March 13). Mr Randall has my
sympathy. However, there is
another side to the case.I find that would-be purchasers
are all too often blissfully ignorant
of the many problems that beset
the unwary. They do not appre-
ciate that there may be more than
one solution to their needs. They
imagine that because a particular
item happens to suit an organisation
they know, it will suit them
too. Some put their fate in the
hands of the sales representative;
others are happy to leave the
choice to their staff - the "try
them all and tell us which one you
like" approach.The one thing they have in com-
mon is that they tell me they have
no need of an independent adviser,
they are sufficiently well informed.
A few of the questions I would
ask them are:

1. Why do you want this equip-
ment?
2. What is it going to do?
3. Have you seen it performing
this task?
4. What benefits will it confer?
5. Are these benefits cost justifi-
fied?
6. Have you taken into account
the likely running and main-
tenance costs?
7. Have you considered the
future - eg can the equip-
ment interface with compu-
ters/word processors/photo-
typesetters/telex etc?
8. If you are buying a software
package, what guarantees are
included?
9. Do you know that hardware is
cheap but software expensive?
10. Do you know that if you have
a software package tailored to
suit your system "even bet-

ter", the change may cost you
more than the whole imple-
mentation?11. Who is going to operate the
equipment and who is the un-
derstudy?12. Can they be spared to go on a
training course? If it involves
computer programming, will
they be able to absorb it? And
will they have time to de-
program as well as their own
job?Sound pre-purchase evaluation
of equipment is essential if disaster
is to be avoided.

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First Finnish mini
reaches the UKA FIRST for Finland in the UK
market comes from Nokia, the
paper pulp to cable conglomerate,
with the launch of its Mikko
microcomputer last week.It is priced at between £15,000
and £25,000 complete with a basic
accounting package.The basic 16-bit machine, with
bit slice type central processor and
separate universal device control-
ler, has a main memory extendable
to a half-megabyte and is supplied
with a full range of mainly Nokia
manufactured peripherals.The software is parameter driven,
but Nokia says it is prepared to
customise it to suit customer
needs.Kurt Wickstedt, the Finnish
executive vice-president of Nokia'selectronic division, said that Nokia
was coming to the UK to learn as
well as to sell.He said that UK software was
the best in the world and Nokia
had used UK expertise to prepare
the Mikko packages. Target sales
for the Mikko series 3 in the UK
next year are 18 to 20 units.Nokia's arrival in the UK mar-
ketplace, which Wickstedt said
was, after Sweden, the toughest in
the world, extends to three the
number of Scandinavian mini
manufacturers operating in the
UK. The company also owns 50%
of British Tissue which dominates
the tissues market.In Finland Nokia has some of
the basic constituents of an inte-
grated manufacturing operation. It

DEC seal of approval decision

SPURRED on by the collapse of
some of its leading OEM systems
houses, Digital Equipment has in-
troduced to the UK the practice of
authorising distributors, inaugu-
rated by DEC in the US about 18
months ago.DEC expects up to eight of its
50 or more existing commercial
OEMs to become authorised by
the middle of next year. About
15%, more than 40, of the Ameri-
can installations are now
authorised although nearly twice
that number applied
unsuccessfully. DEC hopes that
up to 80% of its OEMs will be
authorised eventually.An OEM must present DEC
with its last two years' trading
figures so that DEC can check onits profit, cash flow and funding
position before granting authorisa-
tion.DEC will carry out a survey of
the OEM's customer base to assess
the quality of support provided
and will ask its own sales, support
and credit personnel if a "profes-
sional relationship" exists between
DEC and the OEM.Approval for authorisation will
have to be renegotiated annually.In return, the authorised distri-
butor will enjoy certain advantages
over other OEMs, including finan-
cial support for advertising and
publicity, and the right to use the
DEC logo in promotional material.DEC stressed that OEMs could
be selected in the future would have to

Councils co-operate

AS part of a major co-operative
venture to develop a standard
system for management and ac-
counts in their direct works de-
partments, more than 140 local
authorities in England and Wales
are each contributing up to £1,800
to pay Logica and Price
Waterhouse to prepare a func-
tional specification.Logica says it is collaborating
with Price Waterhouse because of
the latter's experience in local
authority accounting. Apart from
the Chartered Institute of Public
Finance and Accounting, which
gave them the contract, the two
firms ought also to thank the gov-
ernment. The Local Government
Planning and Land Act 1980 re-
quires local authorities to produce
separate accounts for their directworks activities and show a profit
on them from April 1, 1981.
Direct works are those carried out
by personnel employed directly by
a local authority.As well as having to complete
the functional specification by the
end of March 1981, Logica will
also have to have strategies drawn
up that will enable different types
of local authority to implement the
common specification.

Job fears

COMPANIES are using the recession
as an excuse for sacking staff
and bringing in new tech-
nology to replace them. So claims
the clerical union Apex, which is
predicting 500,000 job losses pro-
duced by new technology by 1983.WICKSTEDT... "Coming to the UK
to learn as well as to sell."makes its own boards and has re-
cently bought an American chip
and LSI circuit design group.The Mikko installed base in
Finland, concentrated in the bank-
ing sector, numbers over
1,500 machines.Bomb attacks on
French centres

by Jack Gee

FRENCH police are bracing
themselves for a new wave of fire
bomb attacks on computers fol-
lowing the recent blaze at a central
Paris office building owned by a
major insurance company.Computers housed in the base-
ment of a seven-storey block near
the opera house were undamaged
by the fire, which spread to the
roof where five office workers were
rescued by the fire brigade.Police evacuated 600 people
from the burning building during
the evening rush hour.A few minutes later, an anonym-
ous telephone caller claimed res-
ponsibility for the outbreak on be-
half of the self-styled "Clodo"
movement which was answerable
already for a long catalogue of at-
tacks on computers.Clodo, a slang term for
"tramp", stands for Comité de
Libération Ou de Detournement
des Ordinateurs (committee for re-
leasing or setting fire to compu-
ters).The organisation first made
newspaper headlines last April
when it placed bombs at the Tou-house computer centres operated
by Philips Informatique and CII-
Honeywell Bull.There was no damage and Clodo
made its involvement known by
scrawling slogans proclaiming
"Out with computers".Clodo emerged again on May 20
when it burned down ICL's shop,
again in Toulouse. Computer
wreckers returned to the attack in
the same city on June 25 when
they ransacked a hall which had
been prepared for an international
symposium.The raiders left behind the mes-
sage: "Scientist swine. No to capi-

talist data processing".

CII-Honeywell Bull's centre at
Louviciennes, near Paris, was
singled out in August for a series of
attacks. First, a ten-pound plastic
bomb was left outside the wall of
the building, failing to detonate.Then a security door protecting
computers and confidential soft-
ware was destroyed, police finding
next day a one-foot deep hole
bored in a wall, apparently for a
future explosive charge.Clodo switched its attention
back to Toulouse on September 12
when three fires gutted a computer
and electronics goods shop.

CIS-Cobol link for 8086

MICRO Focus will introduce CIS-
Cobol for Intel's 8086 16-bit
microprocessor next month. The
system is currently under demon-
stration on Rexon Business
Machines' RX30 at Micro Focus'
California base.Implementation involves a
previously-installed compiler ele-
ment, but a new 8086 run time as-
sembler system uses the segmentregister to address the whole
memory space, permitting multi-
user system memory sharing.CIS-Cobol version 4.3 is a Micro
Focus-developed ANSI 74 Cobol
compiler and run time system for
microcomputer and microproces-
sor-based terminal systems cer-
tified uniquely by the US Govern-
ment General Service

Administration.

38
deliversThe productivity advances of IBM's new System/38
are being confirmed in early installations.IBM has started delivering System/38s
to customers.And customers have started delivering
comments like these to IBM:"RPG III and the interactive data base
utilities are helping us to implement new
systems quicker than we ever thought
possible."

Mike Finch, Hospital Saving Association, London.

"I created a special equipment report
in 15 minutes flat. Before, it would have
taken a day and a half of programming."Chuck Peter, Data Processing Manager, Road Machinery
and Supplies Company, Minneapolis."We've developed an online order
entry system with one-third the effort
and the application is much more polished.
We're very pleased."Larry Brenner, Director, Corporate Information
Services, United Merchants and Manufacturers, New York City."The System/38 significantly
reduced the amount of code necessary to
write a program and the time and effort
required to move into new applications.
We're extremely enthusiastic."Larry Peterson, Director of Data Processing,
St. Olaf College, Northfield, Minnesota.

We're on the Move

As from December 15th 1980
Please note our new address will beAnadex Limited, Weaver House,
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Downtime

by Chad

Those bleeps from Outer Space

IT'S that time of year again. Now be honest — how many of you are going to include with presents for your children of hand-held Space Invaders games, the strict instructions that they must not be played in public?

Ed Feigenbaum, of Stanford University, flew over here for the Infotech Review, and was driven nearly crazy by the youth sitting next to him in the plane, whose beeping noises did not stop once during the entire flight.

I think I will suggest to the makers that they incorporate an

earphone socket. Of course that might make people think the beeps were not actually necessary. You've got to have some way of shifting these chips!

On the other hand, let's admit that what we really want to do is buy ourselves a home computer kit. Computer people are strangely attracted to busmen's holidays, aren't they?

Justify it by thinking how those of us with jobs have got to keep the velocity of circulation of money up. Till after our Christmas break, Joyeux Noel.



I SAW a picture of German Communist demonstrators charging the headquarters of NATO's giant economy size "bang bang you're dead" exercise, and their banner was all about a computer, would you believe. Something about "Your computer against ours".

I've heard of computer simulations of World War III but I never knew that the German Communist Party had participated!

It would, of course, be a great idea for the American and Russian computers to fight out the war between them, leaving us humans to get on with more constructive things. But what would happen if the computers decided to call a truce?

British Rail's ode to autumn leaves me . . . stranded

I'M as ready as the next man to applaud the suggestion that maybe advanced technology isn't the answer to all our problems, but I would not expect to see organisations that are supposed to be impressing us with their technical acumen taking the course that British Rail is currently pursuing.

The other evening I spent a delightful 50 minutes sitting in a stationary train outside Balham, immobilised, I understand, by "leaves on the line".

Now what steps do you suppose BR is taking to deal with this problem? It has put up posters in various Southern Region stations that read:

Leaf! Leaf! Go away!
Fall again another way.
Drop in the fields — that would be fine —

But don't descend on the railway line.

Or we'll have you
As residue
— crushed upon the rails —
And wheels will spin
To show the state you've got us in.

I suppose we should be open minded about this, and wait for the figures to see whether this ode actually dissuades any leaves from falling on the track. After all, I keep being reminded of Uri Geller, astrology, "There are more things in Heaven and earth, Horatio . . ."

Why should they try using boring old technology to deal with the leaves? Still, I shall get worried if BR starts using the same technique to try to solve all its other problems. "Signals! Signals! Do not fall!" "Wheel

bearings! Do not wear out!"

Maybe this is a seasonal syndrome, unknown to those of us who work in heated offices. At this time of year British Rail management turn brown and shrivel and fall to the ground. (The passengers do this every time the fares go up.)

Come spring Sir Peter Parker's merry men will blossom forth into their usual technology-ising selves, with more plans for 125 mph trains that run at 60 mph, and so on.

In the meantime, a tribe of Red Indians from Saskatchewan is being imported to do a reverse rain dance all winter to keep the snow off the points. BR's advanced technology group from Derby are planning to digitise this for use in following years, but I fear they will run into software copyright problems.

MICHIE'S PRIVATEVIEW

The physics text book is a fraud

PHYSICS is too often sold as a calculational cure-all for those who want to predict things. Actually it was developed for another purpose: to help physicists to clarify their minds.

Euclid's geometry is bad enough. We were all at some time coaxed, bamboozled or herded through it. But at least when answers can be derived from the axioms and data (they can't always), they come quite quickly. There is no fear of having to drop the whole project on finding the required chains of calculation and inference to be too long to execute in practice.

Dream

With physics, once we leave cooked-up classroom problems for the real world, the matter stands differently. If some physicist disagrees, let him write a program to control a robot monocyclist. He will thereby discover the heuristic adequacy problem. In general his case is even worse. The physics text also fails on epistemological adequacy (see McCarthy & Hayes, 1969, for these terms).

Euclid was for many of us a first glimpse of an enchanted world of order, completeness, consistency, harmony, without ambiguity, fuss or fuzz. Every statement is either true or false, and if true then provable from the axioms. Around this dream of perfection were assembled the philosophies of the

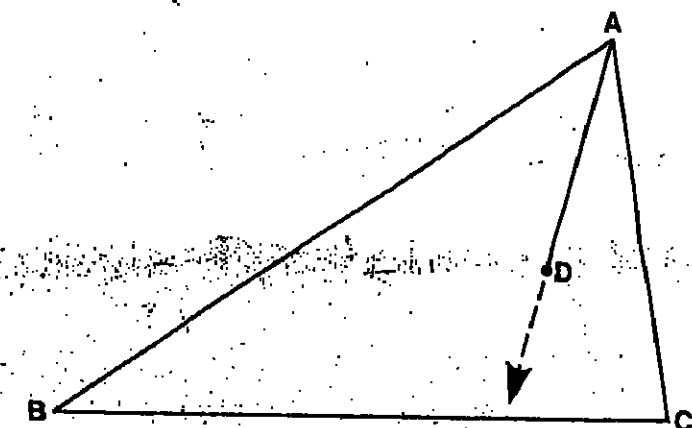


Figure 1

Greek world, and a very great nuisance they eventually became. Almost two millennia after Plato, it took Kepler half his working life to shake free of ideal Euclidean forms. Finally despairing, he decided to go for a more feasible model of planetary motion, and thus opened the doors of computational astronomy.

Vantage point

So if the glimpsed scene turns out to be not what it seems, what then? A new viewing point sometimes aids restoration of a fractured scene by placing it in an enlarged perspective. As each new

floor is added to the edifice of science, a vantage point is provided from which to view the cracks and gaps of lower and earlier structures.

To illustrate, let us draw a triangle, any triangle at all (see figure 1). The dotted line dissects the angle BAC into two components BAD and DAC. If the line AD is produced indefinitely as indicated by the dotted arrow, must it necessarily intersect the line BC?

Of course it must! But can you get out your geometry books and prove it? Peter Hilton of Case Western Reserve University assures me that you cannot. The notion that a closure (line round which a bug could run for ever) partitions the plane into just two sets of points — "inside" and "outside" — and that passage from one partition into the other cannot be achieved without crossing the boundary, is not embedded even implicitly in the axioms, although it is in elementary set theory. But in the edifice, set theory is housed on a higher storey than Euclidean plane geometry.

Monkey

Returning to physics, consider a warehouse, robot named Monkey who has been asked to fetch a tool kit (for some reason code-named Bananas). The latter is suspended high above the floor by a string, beyond Monkey's reach. In a corner stands a pile of garden shears with long handles long enough for Monkey to be able to reach the string with the blades. What does Monkey, or Monkey's keeper, need to know about this little world in order to calculate a plan of action? How much of the needed knowledge can be found in the physics texts?

Physics might tell him quite a



Professor Donald Michie is head of the Machine Intelligence Research Unit at Edinburgh University.

few things he didn't want to know, like the terminal velocity of Bananas if the supporting string had somehow been cut, or the heat generated on impact. On the general problem of situations, actions and causal laws, the physics text reveals itself to Monkey as a fraud.

Ghosts

In a later Privateview we return to Monkey. Meanwhile the reader may wish to glance at P. J. Hayes' "Naive Physics" (in Expert Systems and the Micro-electronics Age, Edinburgh University Press, 1979). Just as some ancient Greek, aware of the gapiness and ridiculously small scope of Euclid, might have put out an exploratory probe into the unknown calculus of sets, so today the first approaches are being tried to tomorrow's calculus of causality.

The ghosts of the geometers waited more than 2,000 years. Industrial robot technology, if nothing else, will this time ensure a faster pace.

Donald Michie

REFERENCE

McCarthy and P. J. Hayes (1969). Some philosophical problems from the standpoint of artificial intelligence. In *Machine Intelligence 4* (eds. E. Meltzer and D. Michie) pp. 463-502. Edinburgh: Edinburgh University Press.

TEN YEARS AGO

From Computer Weekly of December 10, 1970.

RESIDENTS of Watford, Bromley, Croydon and Paddington have been cast in "guinea pigs" by the Post Office in a unique experiment. They are the first to have their records stored on a master file to be processed by a computer. The University of London's Imperial College of Science and Technology has been awarded a series of far-reaching changes in both computer technology and personnel. The most immediate being the appointment of Professor John Westcott and installation of a new Control Data 6400 system at the college.

FOCUS

Christmas countdown

ONCE upon a time in the far-off milk and Honeywell land, all was not well. After last year's Datatalk revelations, the operations manager had cooked the books and booked a Laker flight, taking the installation manuals and the dishy blonde marketing assistant Sue.

Subsequent information retrieval ransom had taken much soul and cash searching. Never very lavish, the Datatalk installation budget had to be diverted to funding the return of the manuals — funds did not run to Sue retrieval.

As a result of budget deprivations, the installation had to make do and mend, with emphasis on mending; in fact, much of the year had been spent IBM-watching.

Approaches had been made to King Digitus Prolificus for an early allocation of next year's budget. Alas, the response had not been promising.

The royal coffers were as frugal as a personal computer operating manual or the site engineer's toolkit. Ducal priorities were more involved in building a sauna and gymnasium in the new palace.

Measured tone

Of course, all this did not help the DP team who were working in a D and A (down and out) mode. Once again, our hero the DPM approached the royal ruler.

In a measured tone, he informed the King that the whole DP system was about to do down the tube.

The timing was unfortunate as a new computerised tax system was about to be announced. This involved a special levy on all types of printed and design information, whether TV programmes, cornflake packages or posters.

DPM was advised to keep his tapes spinning or face the alternative, a well-placed Ducal boot. This being a practical datatalk, there was no magic slipper, bean or fairy godmother to hand.

High hopes

Next day, DPM warily approached King DP who was pointedly swinging a large boot-encased leg. Sire, he reported, all is well, thanks to DI.

Reveries were now flowing as would-be tourists. The Thomas Cook database had also been intercepted and the Royal palace was on the package tour list.

The team was now working on Electronic Fund Transfer and there were high hopes that shortly some funds (electronic or otherwise) would be transferred to the Ducal coffers.

Good news, said King DP. "As a gesture, I'll rescind the information tax and allocate funds for purchasing a new telex machine. In the meantime, we would personally reward DI. Have her report to me now, please."

Once again, the moral of the Christmas Datatalk is clear. Those who offer a blipping hand are likely to end up chastened.

Open day

Nigel, the systems manager, made the only practical suggestion. "Why don't we stage an open installation day? We could charge an entrance fee and earn possible extra revenues."

Nigel suggested that the VDU could be converted to Atari mode, featuring Star Wars, Space Invaders and a rigged version of backgammon. WP manager Karen could process words on demand at cut-price rates while the printer could produce individual horoscopes and welcome messages on demand.

As in all well-structured datatalks, help was at hand. Secretary Di, whose talents were more noted in such areas as the site storehouse and archives, started all present by saying she had an idea.

Apparently, she had heard of a successful attempt to interface with a giant banking computer network. All that was required was a second-hand telex plus some luck.

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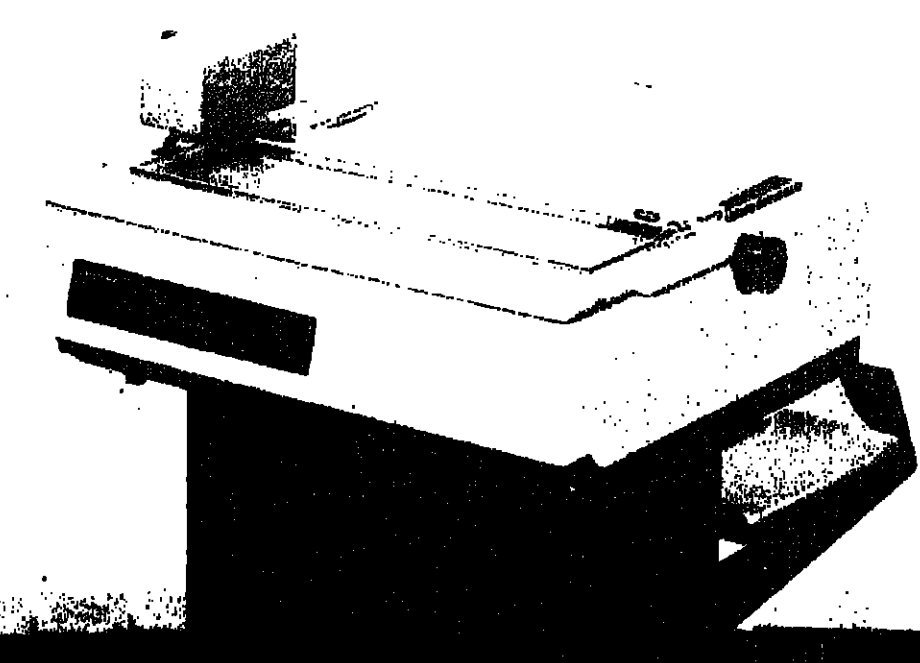
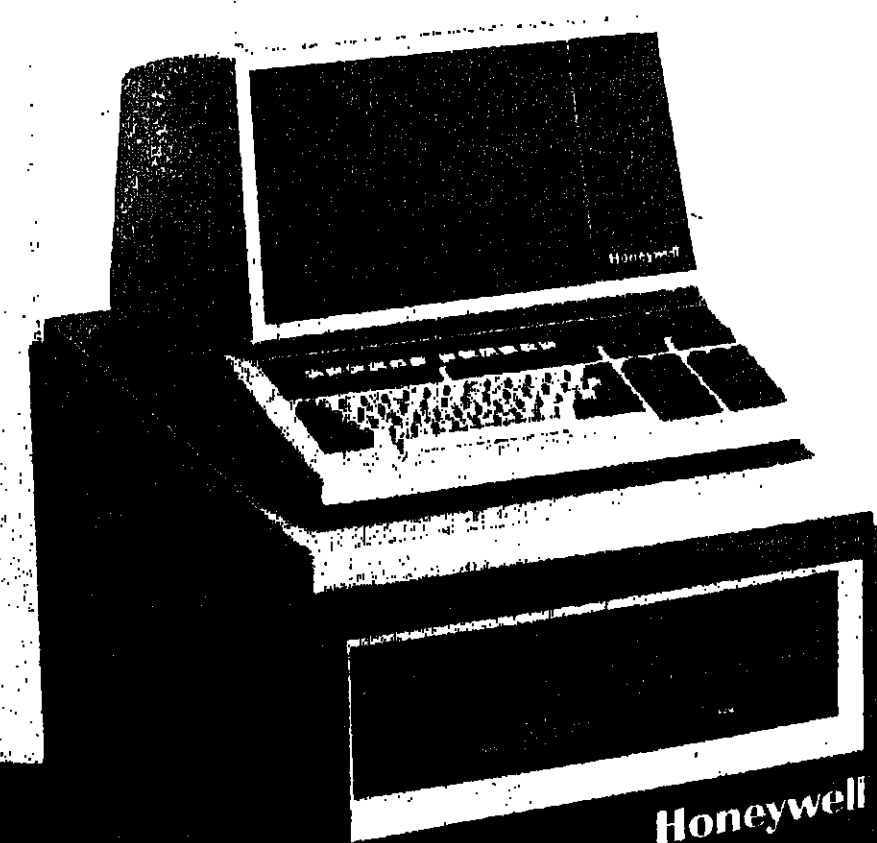
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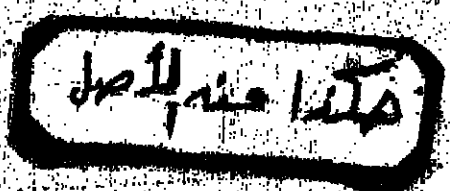
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Builder's £25,000 program rewrite nightmare

THE computer nightmare of small business — an enforced upgrade entailing expensive custom software rewriting — faces Hertfordshire builders Northover Bros. A suite of programs costing £2,500 only four years ago may have to be rewritten at a likely price of £25,000.

Company secretary John Wilson says the firm bought its Kienzle 6000 as something of an innovation seven years ago but deteriorating hardware means it must be replaced.

"The Kienzle was bought from Northampton-based distributor MBM which went bankrupt and was taken over by Systime in January 1979. Although Systime maintained a previous service contract for a short while, the firm gave notice of termination later.

Wilson recognises that Northover, with a £500,000 annual turnover, needs to buy a more sophisticated machine, possibly with multi-programming and distributed data processing.

But there is a major complication as MBM also supplied the software written in Assembler and Wilson envisages: "The frightening prospect of having to rewrite to a new machine."

The original software worked very well, giving Northover contracting and costing routines complete with proper audit trail.

"We need a system of accounting that the customer can understand," says Wilson.

"It is no use having a total figure, or an indecipherable string of characters. All our

invoices must be broken down into items, so that if it comes to a dispute we know exactly what we're talking about."

Northover won a court case against a customer trying to evade payment through such itemisation. Wilson observes: "Several other builders who didn't have our chapter and verse came unstuck and lost a packet."

Wilson approached Systime in May 1979 and suggested a program rewrite but the company was prepared only to offer him financial packages — payroll and similar items.

Wilson has also been round most of the exhibitors and seen the larger companies like IBM, ICL and Burroughs.

"We are in a rather unusual position at

Northover," says Wilson. "We deal with small numbers of very complex records — just the sort of thing they say not to computerise. But our previous package worked so well that I could extract a simultaneous invoice and costing record in seconds. And that's what I'm looking for again."

His best leads to date have stemmed from last month's Compec, where he renewed contact with Systime.

Whichever way he looks, Wilson's Kienzle replacement will cost him too much. "The building business is wide open to computers," he says firmly. "But the computer industry will have to pull itself together if it is to serve companies like ours."

H-P uptime guarantee but not for UK

IN THE US and the rest of Europe an important part of the sales pitch on Hewlett-Packard's new Series 44 HP3000 minicomputer is an option to insure for 99% uptime. But a similar guarantee is not to be offered in the UK.

The UK's western area computer manager, Martin Davis, says: "We would like to wait some months, before launching the product. Maybe we're taking too conservative a stance, but we need a little more experience with remote diagnostics over PO lines."

However, Heinz Blasser, general manager of computer marketing responsible for European sales and support as a whole, says: "Our intention is to provide the same level of service on our side of the Atlantic as is provided in the States." He will decentralise regional support centres to bring remote diagnostics as close to the customer as possible.

The insurance (or guarantee as Blasser calls it), where available, will cover CPU, main memory and discs and will be priced at less than 10% over the overall purchase price.

It depends on customers meeting several conditions: A representative must remain on site while any repairs are carried out; an operator will have to have been sent on an HP training course; and there will have to be PO approval for modem connection. The scheme will operate in the US from February 1, 1981.

Increased confidence in the Series 44 is based on several hardware improvements. These include a reduced chip count on memory boards and a control and maintenance microcomputer system mounted in the 44's power case. Based on an in-house 16-bit micro known as the MCS, it self-tests the CPU and provides remote diagnostics through HP's Remote System Verification Program, RSVP.

Banks look to a mix of telecoms and computers

BANKS are looking increasingly to a mixture of telecommunications and computers to solve the problem of moving money around. This emerged when over 90 bankers from 14 countries gathered for a recent Infotech conference in London to consider the state of the art in relation to electronic fund transfers and to take a cautious peep into future developments.

Logie's commercial division manager, Chris Rees, established a conference keynote when he described banks as "pioneers in the computer networking field... often despite themselves".

Rees said that banks predicted in the late 1960s "significant business growth coupled with continuing wage inflation."

As banks are labour-intensive, this growth would be both costly and unprofitable to support.

The computer industry was available with hardware and software technology to support major networks, using existing PTT-supplied voice grade lines.

International Swift, Chips and Fedware developed from that initial point in the United States, Idaho being developed in Scandinavia.

Stephen Earnst, from the Bank of America, explained that 94% of American households possess cheque book accounts, a total of 37.1 billion cheques being written in the US this year. This volume posed enormous problems for American clearing banks.

Ubiquitous

So far, there are 32 different American automated clearing houses and the ubiquitous credit card, by producing all these payment authorisations, increased rather than diminished paperwork.

It might appear like a paperless society to the consumer, but people in the rear offices of banks saw the outcome as a paperwork society.

Summarising, Earnst envisaged an increasing effort by American



EARNST... Paperless society becomes the paperwork society.

They compete with the DEC PDP-11/34 and Data General Eclipse C/150 in the case of the model 500, and with the PDP 11/44, Eclipse C/350 and

A point entering clearly both from the conference hall and from activity within the industry as a whole was that banks will form the second largest market for computer equipment over the next decade.

Most of that money will be spent on networks connected with electronic fund transfer.

Univac extends V77 mini range

FURTHER emphasis on distributed processing can be expected from Sperry Univac after the announcement this week of two more models in its V77 minicomputer range. The V77-500 and V77-700 are aimed primarily at the distributed processing market, which minicomputer operations manager Peter Robinson estimates is growing at between 30 and 40% a year.

The two new models slot into the 200/400/600/800 range, offering a performance increase of about 30% over the next model down, according to Univac.

They compete with the DEC PDP-11/34 and Data General Eclipse C/150 in the case of the model 500, and with the PDP 11/44, Eclipse C/350 and

Honeywell Level 6/43 in the case of the model 700. Univac hopes to boost OEM sales with the two new models.

The 16-bit machines have one and two megabyte memories with optional writable control store of 2K words (48 bits per word). Memory cycle time is 750 and 600 nanoseconds respectively. The model 700 also has the option of a floating point processor to accelerate execution of Fortran programs.

All machines in the V77 range are fully software compatible and allow field upgrading. They are also compatible with Univac's networking software, including transaction processing and database systems and the company's distributed communications archi-

ture for packet switching interfaces. The two new machines run the Vortex II operating system common to the V77 range.

Since moving into minicomputers with the takeover of US minicomputer Varian Data Systems in 1977, the US and British arms of Univac have taken different marketing routes. The concentration in the US has been on the OEM market while the UK company focused on multiple sales from the back of its existing mainframe user base.

The UK minicomputer division is more profitable than its US counterpart as a result, says Robinson.

Some 75% of V77 sales in the UK are direct to end users.

Brokers offer cover against computer misuse

COVER against computer misuse and loss of data can be included in policies now offered by Barron (Insurance Brokers) of New Street, Birmingham. The company says that its policies go well beyond the traditional "material damage and breakdown" cover.

Barron's policies indemnify its

clients, for example, from interruption of business due to prevention of access to premises in which the computer is located. Also covered is failure of the public electricity supply.

But particularly interesting is the cover available for loss from the accidental or malicious era-

ture, distortion or destruction of data and from computer misuse. The latter is defined as fraudulent or dishonest program manipulation or insertion of data or data carrying materials. Legal liability to third parties arising from computer misuse can also be insured.

MP gains time for Info Bill

BACKBENCH MP Frank Hooley (Lab, Sheffield, Hestley) is reviving the push for a Freedom of Information law by adopting the Outer Circle Policy Unit's draft Bill, similar to that proposed by Clement Freud and lost at the General Election.

Hooley has won third place in the ballot for private members' Bills and has an outside chance of gaining adequate parliamentary time.

A Freedom of Information Act would force the Civil Service to reveal all government files for public view, with certain specific exceptions dealing with law enforcement and the privacy of third parties. The new Bill differs from Freud's (CW, April 5, 1979) mainly in a clause giving data subjects the right of appeal to the Ombudsman over errors in files and revamping the second part, which replaces the existing Official Secrets Act.

This latter is modelled on the Conservative government's own proposals but with reduced coverage and power given to courts instead of ministers.

US 'right to know' policy looks safe

THE faltering steps which have marked US progress towards a national information policy look reasonably certain of continuing when Ronald Reagan's administration takes office next month.

This prediction appears reasonable despite the departure of National Telecommunications and Information Administration head Henry Geller and his deputy Ed Zimmerman.

There is no present indication of their replacements but Republican reaction in Congress to the NTIA's recent telecommunications and privacy bills has been positive and leads Geller to believe there will be continuity of policy.

It is normal United States practice for agency heads and their deputies to be replaced when the presidency changes, even with organisations as small by US standards as the NTIA with 325 staff.

In any case, Geller is well known as a liberal Democrat and admits that "there has not been a lot of

concrete action" towards constructing a national information policy along the lines he set out two years ago (CW, February 15, 1979).

Exceptions to this general rule lie in the fields of privacy and regulation of telecommunications. There are now five unfinished privacy Bills pending, four dealing with records — insurance, medicine, Federal health research and electronic funds transfer.

Termed the Fair Information Privacy Practices Bill, the fifth would greatly extend the provisions of existing credit laws to cover cheque authorisation and compel provision of more readily obtainable information to the consumer.

The NTIA's Communications Bill was intended to tackle problems caused by converging technology, such as AT&T cross-subsidising data processing services, and to promote competition.

A lawyer by training, Geller believes passionately in the need to protect individuals from the effects of advancing technology and to "redress the balance." He issue he hopes to pursue in a future academic career.



THESE operators all work for Barclays Bank. They were removed from their usual surroundings to help farmers viewing the annual Smithfield Show last week work out the profit and loss on their machinery leasing and farming operations. The farm financial models were run in real time at the show from IBM's CALL service in Basinghall Street, London. Over 750 farmers used the service during the four-day show.

Lisp software launch

LISP software, with processors designed specifically to run it, is to be launched early next year by two new Los Angeles companies, Symbolics and Lisp Machines Inc.

Control Data is to be an early customer for two machines from LMI and wants to invest in the company. Texas Instruments is also buying two machines.

Lisp is said to make efficient use of processor power and to be good

for manipulating large quantities of information, such as are used in geological analysis, genetic engineering and integrated circuit design, but it has previously needed a large mainframe to run in.

LMI's first machines are priced at \$160,000 including the operating system — the price of a large mini — and it plans to halve the price over the next 18 months while at the same time tripling their power.

Training for sales career

INSIGHT Marketing and Personnel Consultants, IMPC, the London-based sales and marketing recruitment agency, is starting a monthly series of one-week residential training courses. Catering for existing computer staff wishing to become salespeople, the first course will start on January 19 at Olivetti's training centre in Hestley.

Groups containing up to 12 students will be placed in jobs prior to attending the course, the cost of which will be absorbed into IMPC's standard recruiting fees.

The course is designed to "bridge the gap between people who want to sell and companies who want sales people."

A SCHEME to save £50,000 a year by reducing drug stocks was due to be discussed by Coventry Area Health Authority on Tuesday.

Supporters of the stock control and drugs "library" scheme claim that a one-off saving of £50,000 could be made and later, savings of £50,000-£70,000 a year.

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Atkins-LUCS merger completed

A CAUTIOUS approach to expansion in the rest of Europe is being adopted by United Computing. This is the name just announced for the organisation that combines the forces of London United Computing Systems and Atkins On-Line, a computing services group which has chalked up a turnover of more than £7 million this year.

Atkins On-Line and LUCS were brought together in 1979 when the LUCS parent company in the US, United Telecom of Kansas City, took over Atkins' parent, On-Line Systems of Pittsburgh.

Dennis Chandler, managing director of United Computing, regards the acquisition as a takeover in reverse as far as the UK is concerned because five out of the six members of the United Computing

board are former Atkins On-Line executives. Chandler himself was managing director.

The board is currently based at the former Atkins On-Line centre at Epsom, although a move to the former LUCS offices at Leonard Street in the City is being considered.

United Computing provides about 10% of the turnover of the United Information Systems, the organisation that embraces all the data processing interests of United Telecom. They include Kansas City-based United Computing Systems, which runs a Cray.

The Cray can be accessed via the UK operation, substantially strengthening its already prominent position in the engineering computer services business.

UK data protection laws delayed

PRESSURE of other work has made it unlikely that the House of Commons will make immediate moves towards implementing data protection laws, despite pressure from the Council of Europe.

The select Committee on Home Affairs has noted the time Home Office officials spent considering the Lindop Report on Data Protection but has not had a chance to investigate the issues, committee chairman Sir Graham Page (Con, Crosby) told Computer Weekly.

Lindop is only one of several reports surveyed in Home Office Reports published on December 10.

According to Page, the committee will be occupied fully until the

new year with penal issues and has not decided on its next investigation.

Home Secretary William Whitelaw has promised a pre-Christmas statement and the government seems reconciled to meeting the Council of Europe requirements embodied in the latter's data protection convention.

A Home Office proposal for a Data Protection Bill is understood to be under consideration by the government. Details are not known, except that, as expected, they do not involve the setting up of a Data Protection Authority. There is doubt in some civil servants' minds whether the proposals would satisfy the requirements of the Council of Europe.

Time-slot service extended

TIME-SLOT, the personal information service, has been extended and linked to a payroll service. For an introductory period, Croydon-based Peter Merrick Associates is offering the service for £60 to £90 a week depending on

the number of employees. The payroll service is extra. The offer includes unlimited access to the customer's own information database held on the Time-Slot Prime 1000, and supply of a VDU and printer at his own site.

Prestel printing trial

THE paper and printing industries are to use one of the electronic media which may eventually see them off. This month Prestel terminals from Radio Rentals are to be installed at 50 paper merchants and 50 printing

firms in a two-month trial sponsored by the magazine Paper Facts and Figures. The magazine's database on Prestel shows price changes, stock levels and clearance offers for paper and board products.

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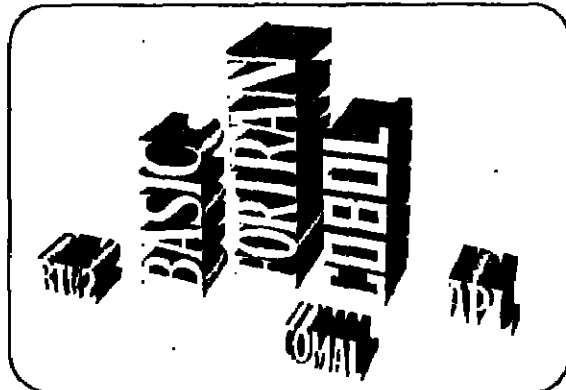
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SOFTWARE FILE



MINORITY LANGUAGES

Any programmer looking for an up-and-coming language to learn, or DP manager considering a new tool for a particular job, is faced with a bewildering variety. A range of specialist and general-purpose languages has grown up to match new skills and refine old ones, as the computer infiltrates ever-widening spheres of application.

Commercially, Cobol, Basic, Fortran, and more recently Pascal still rule, but their heirs are to be found in a new generation which builds on the lessons learnt in the last 15 years. In this and the next two issues, Software File will be sampling a few of these "minority languages" and handing over to experts in them to explain their particular charms and virtues.

This week JOHN BARNES, who originally invented RTL/2 to cope with real time processes, explains the background and uses of the language.

John Barnes is director of language research at SPL's Abingdon Research Centre and a member of the Language Design Team involved in the new US defence language Ada.

RTL/2 — born of the falling price of hardware

DURING the 70s the price of hardware has fallen dramatically and as a result there has been an explosion in the demand for software. This demand was foreseen at ICI, and a five-year project started in 1969 resulted in the birth of RTL/2, a high-level programming language suited to process control and similar embedded applications.

A prototype, naturally known as RTL/1, was in use in 1970. Based upon Algol 60 but with several additional features including a mechanism for the online replacement of program sections, it was appropriate to a then popular con-

figuration of 48K words and a megabyte of fixed disc or drum.

Experience from the use of RTL/1 was fed into the design of RTL/2. Perhaps the biggest item of input was that the range of target configurations had changed dramatically; down to 8K core-only machines.

It seemed that the falling price of hardware had in the main opened up opportunities for new small applications rather than the more lavish use of hardware in existing fields of use. As a consequence RTL/2 is very different from RTL/1.

The first draft definition of

RTL/2 was written in January 1971. A bootstrap compiler (for the ICL System 4) was written in RTL/1. Production quality compilers for the System 4 and PDP-11 were then written in RTL/2 and made available for general use throughout ICI in July 1972.

These were constructed using the now familiar root compiler technique. Both contain a common front-end which converts RTL/2 into the same abstract intermediate language; this is then followed by a back end or code generator which converts the intermediate language into the appropriate object code.

This technique simplifies compiler portability and helps to ensure that implementations differ as little as possible. These two early compilers both ran on the System 4. The compiler for the PDP-11 was a cross-compiler from which the object programs had to be transferred onto the PDP-11 on yards and yards of paper tape, the target machines being far too small to support a compiler.

The language was changed very slightly during 1972 and 1973 in order to remove dead wood and reduce the compiler size. It was frozen at the end of 1973. During this period some 20 process control applications were programmed in RTL/2. This also required the writing of a range of operating systems known as MTS, themselves written in RTL/2. All the target machines were PDP-11s; the System 4 and various IBM 360/370s were used for cross-compilation.

Control

The success of RTL/2 in ICI resulted in its being made commercially available through SPL International in April 1974, and since then it has gone from strength to strength. More than 20 new implementations have been written, and without exception all have incorporated the same standard front-end. In addition, support packages have been developed so that the object program can be run under various operating systems. In the case of the ever popular PDP-11, most users run RTL/2 under RSX-11M.

Perhaps one of the most important technical aspects of RTL/2 is that it recognises the need for features aimed at programming in the 'large'. It allows a program to be developed in individual separately compiled modules and gives the user control over visibility between the modules.

The implementations also allow these interfaces to be checked so that, for example, a procedure with two parameters in one module is not called with only one parameter from another module. In these respects RTL/2 is far superior to Pascal, which was designed as a teaching tool and is really only suitable for small programs.

At a lower level, RTL/2 provides an appropriate range of data types and structures. The basic types include bytes (of characters), integers, fractions (for fixed point machines) and reals. Data structures include arrays, records and typed references. The Algol 68 style record structures give RTL/2 a big advantage over its old rival Coral 66, with its ad hoc tables and dangerous anonymous references.

Other data types are aimed at giving the user control over error



Barnes

recovery (or exception handling, as young Ada calls it), I/O channel selection and task control. It goes without saying that being designed for real time applications, RTL/2 naturally supports multi-tasking. All code is read-only, local data is implemented on a stack and procedures are automatically re-entrant, provided they do not use global data.

As stated above RTL/2 is used for writing both application programs and system programs. The needs of these two areas are slightly different: system programs need more flexibility. To recognize this and in order to give management control, RTL/2 compilers have a facility whereby certain language features — for example, the ability to descend into machine code, to leave references uninitialised and to omit certain subscript range checks — are not available in the application programmer.

The intention is that in the application mode, the constraints are such that all programs are inherently secure and cannot run wild, and this inherent security is an enormous benefit when first debugging a new program. Moreover, the overheads involved are very low and can be allowed in a production program, thereby allowing the manager to sleep peacefully in the knowledge that errors in the software will be trapped.

RTL/2 is a very machine independent language. The only significant aspect which is not easily prescribed is that the range of integers depends on the word-length of the machine; even so, the standard dictates a minimum word-length of 16 bits.

Portability

The portability of the language itself is enhanced by the existence of system standards for interfaces such as input/output and error recovery.

The use of RTL/2 is now spread over the globe, from Argentina to Sarawak and from Canada to Australia. Users include famous names such as Plessey, British Aerospace, Du Pont and Philips. Naturally, many users are in Western Europe, and there is a strong concentration in the Netherlands where the free market is not impeded by politically supported local products, such as Pearl in Germany. The uses include process control (for which it was designed), automation, order processing, communications and many, many others.

RTL/2 is now available on a wide range of machines including the PDP-11, VAX-11/780, Interdata 8/32, Philips P800, Hewlett-Packard HP1000, DEC VAX-11/780, ICL 2900, Intel 8080 and Motorola 6809. Of these, the PDP-11 still dominates with the VAX and various micros growing in importance.

The success of RTL/2 can be attributed to two factors: its portability and commercial support.

A long period of stability is now expected, with growth of use not only on traditional minicomputers but also on new microcomputers.

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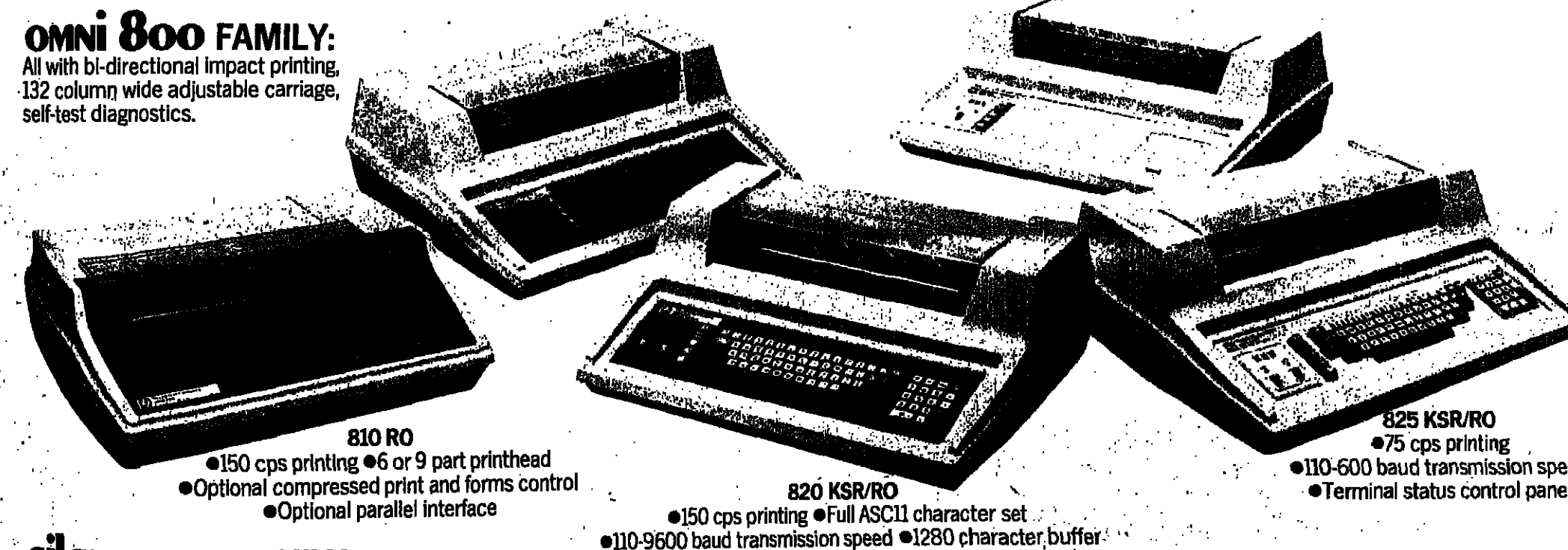
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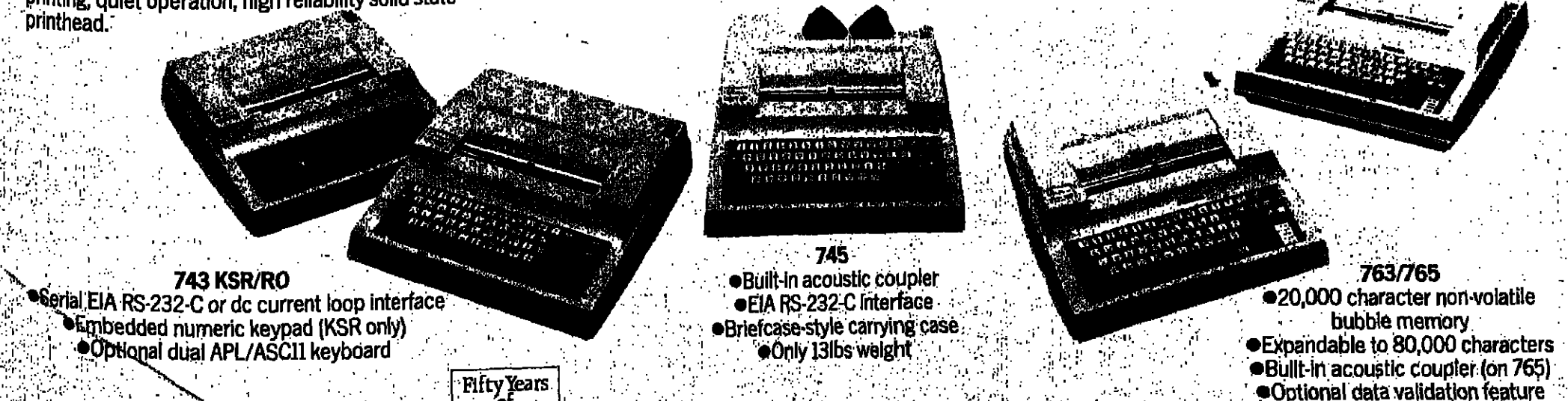
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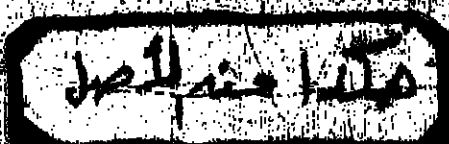
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DEC deal sought by Floating Point

by Keith Jones
WITH about 60% of its European customer base comprising digital equipment users, array processor manufacturer Floating Point Systems is looking at a possible joint marketing agreement with DEC, similar to cooperation existing already between the two companies in the United States.

There is no contractual relationship but the companies exchange confidential information and DEC promotes actively the FPS processors interfacing with its PDP-11 and VAX machines.

This close co-operation exists only between FPS and DEC's Laboratory Data Products division, the latter interested primarily

in the smaller FPS processors with 38-bit floating point formats. FPS hopes to forge a similar agreement with DEC's Engineering Services Group which markets the 32-bit VAX 11/780. FPS offers attachment of its model 164 array processor which features a 64-bit floating point format.

FPS continues to sell its machines to users of the wide range of other host computers, both minicomputers and mainframes, with which they can interface.

The UK-based FPS operation at Bracknell has picked up more than 100 British, Dutch and Scandinavian customers with application areas including image processing,

aircraft simulation, seismic services, radar, sonar processing and structural analysis.

Apart from DEC, commonly used hosts include machines from Prime, Systems Engineering Laboratories and Perkin Elmer.

FPS machines employ a pipelined architecture resembling the design of the Cray Research and Control Data vector processors rather than parallel processors, like the ICL Distributed Array Processor.

DAP is a Single Instruction Multiple Data machine where one instruction is duplicated per microprocessor in a two-dimensional array, multiple data items being processed in parallel.

Intel fights pirates with CAD

LEADING US microelectronics company Intel is to incorporate computer-aided design techniques into its chip redesign programmes in an attempt to combat the market squeezing of plagiarists.

The company receives less than half the turnover involved in its single chip 8-bit microcomputer, the 8080, although it accounts for more than half the 8-bit market. The rest goes to about a dozen companies which have copied the chip without a second source agreement.

Intel considers that CAD will speed up the redesign and improvement of its chips and reduce the cost, enabling the company to keep a lead over plagiarists and other competitors.

Intel has devoted about 10 per cent of its total research and development budget (9 million) to CAD.

Manual redesigns normally take up to a year and cost between \$500,000 and \$1 million; using CAD this can be reduced to six months and \$50,000.

In the conversion of single chip 8-bit microcomputers - the 8048 and 8049, the 8085 8-bit microprocessor and 8086 16-bit microprocessor - to HMOS technology, Intel claims to have saved between \$1½ million and \$2 million and to have gained six months on the competition.

Particularly good at plagiarism are the Japanese companies which tend to wait until the smaller, faster and cheaper versions are on the market before they go ahead and copy.

'Future Shock' to affect DP dept first

THE DP department is a company within a company which should prepare now for the drastic structural changes to be brought about by new technology - one of the first examples of "Future Shock".

This was the message put over by US consultants Dick Nolan and Dave Norton at the first major lec-

ture event staged in London by their firm, Nolan, Norton and Co, which opened offices here in July.

The Boston-based consultancy was established by Nolan and Norton in 1975 when they gave up lecturing at the Harvard Business School.

They now employ 75 professional consultants and claim to be

one of the few big firms in the business to have concentrated on computer management consultancy from the start.

Company chairman Dick Nolan believes that his firm has the best DP management library in the world.

Addressing an audience of senior DP managers at the Tower



Micro Computer Centre chief engineer Malcolm Norther checks out an ailing Pet at his company's Sheen headquarters.

Sheen-style micro boom

CYRIL GRANT, founder of the Micro Computer Centre which has moved to larger premises in Sheen Lane, London SW4, told Computer Weekly that company turnover had risen by 200% this year.

"We did £280,000 worth of business last year and this year the figure has risen to £750,000," he explained.

The centre was established 20 months ago and employs a current staff of 24, including six programmers and three engineers.

Micro Computer Centre offers a wide range of microcomputer services, including packaged programs, customer-oriented systems and maintenance plus

hardware. In the words of Grant, the centre "aims to meet the needs of local businessmen" within a 50-mile radius of Sheen.

Customers include a local fish and chip shop and wine merchant and the company's maintenance service is claimed to react to customer machine problems within five minutes.

The company will extend its activities by starting a micro school both for computer students and business people. Three one-day seminars will be held on January 7, February 11 and March 11.

Micro Computer Centre's telephone number is 01-878 7044.

UK needs a govt micro policy, says report

THE UK is weak in 1-2 micron bipolar and MOS technology and will need experience with advanced wafer printers and electron beam equipment in order to be able to meet industry demands in four to five years' time.

This was one of the main conclusions in a microelectronics industry progress report compiled by the electronics components working party of the National Economic Development Office. The working party is chaired by Eric Hammond, executive councillor of the Electrical, Electronic, Telecommunication and Plumbing Union.

The report highlights the lack of a UK microelectronics policy by criticising the lack of government support on microelectronics applications, and in the production of customised circuits.

This could eventually endanger the UK industry because of the imbalance between UK-owned and foreign semiconductor plants.

The report recommended that the government should increase the limit of support from 25% to 35% of project investment and extend the original deadline of 1984 for the Microelectronics Industry Support Programme.

The report went on to say that the industry's infrastructure is becoming weaker; for example, there is no UK optical lithographic equipment.

If the forecast production of standard integrated circuits in the UK is reached there could be an adequate market for a UK silicon crystal growing company by 1985, stated the report.

The report comes at a time when Immos, the sole UK microelectronics venture, is at the stage of ordering such advanced equipment for its first semiconductor plant, under construction in Newport, Gwent.

On the technology side, Racal and General Instrument Microelectronics have recently announced a joint venture, which will involve production of silicon gate CMOS devices at 2.3 micron dimensions over the next two or three years.

Catching crooks

MATCHING fingerprints at the scene of a crime with those of known criminals on file should be much easier with a computer system developed by Logica, now under consideration by Scotland Yard.

A pattern recognition program allows photographs of fingerprints to be scanned automatically to find out from the file whose prints they are.

Poor quality prints need to be encoded by hand, after which they can be fed into the recognition process and matched in the same way. Whether the police will go to buy Logica's system is not yet decided, but if they do the Home Office's array processor made by Floating Point Systems will be used.

Engineer's aid

A STRUCTURAL design and analysis package is available on the Petmicro for under £3,000.

CAD2analyse, developed by Computer Aid Design Services, is a program dealing with load bearing members, pinned or rigidly joined. Very little data preparation is required - all the user needs to input is a sketch of the dimensions and a note of the loads.

The system is seen as a design aid on the...

MICRO NEWS

Texas prepares turn-of-year software launch

THE first additions to Texas Instruments' component software library, and the Amplus software development system will be available from TI distributors later this month and in early January respectively.

A concept originated by TI in an attempt to combat the software crisis (CW, August 14), component software offers the 9900 family user a library of real time, concurrent software packages which can be used continuously for a fixed annual sum. The first two packages released a month ago, the real time executive (Rx) and file manager, form the heart of the concept.

The five new products include an EIA (Electrical Industry Association) communications package, an HDLC (high-level data link control) communications package, a math pack, a data pack and a file I/O pack.

All are configurable, that is they are modularly structured so that the user can select only those features relevant to his application.

Payment

He does this with the help of Amplus, and then takes the sections required from the disc, blowing them into EPROM, again with the help of Amplus.

The whole concept has been designed by TI as a way of overcoming increasing software costs.

TI predicts that the cost of developing software for a system will be around 90% of total development costs by 1985.

TI has developed an interesting way of charging for its component software, which differs from current methods. It is supplied on disc as a source and object routine library, with documentation copyrighted and supplied under licence by TI.

An initial one-year licence fee of around £1,000 covers in-house software use or manufacture and sale of products. TI does not in-

crease the price of the software bus is an abstract representation of timing instructions and implementations, enabling the processor to share time between software components.

Component software can be implemented with any hardware bus although TI has introduced simultaneously the E-bus and hardware modules which correspond to, and work with, the software components.

For example, the TM 990/303 floppy disc controller board goes with the file manager package. This should be available on Euro-card next year using the 9909 device.

Bubble file

TI hopes to introduce a bubble file manager system which could be provided as an update to the file manager package.

The EIA communications package can communicate with other processor systems and works with the 9902/307 datacom board.

HDLC communications packages support communication with different processor systems, including mainframes and programmable controllers, working with 990/308 boards.

TI hopes that the E-bus will become a standard because of the small number of pins involved - 64 compared with Motorola's 140. It can take single and double Euro-cards and comprises a 16-bit data bus.

The company will provide main boards and marketing specific application boards for a user making them.

Math packs, data packs and file I/O packs all assist the assembly language Rx user. The first comprises complete ranges of arithmetic and trigonometric functions, the second sets of other operations like signed arithmetic, string compare and array manipulation.

File I/O packs provide device independent routines between the user application and component software subsystems, enabling software to be written independent of the device with which it will interface in a general form.

Component software and the Rx software bus were designed to operate with any of the 16-bit 9900 family of microprocessors including the latest, the 9995 (CW, November 13) which has on-chip RAM and was designed in Bedford. According to MOS and Systems divisional head Peter Van Cuylenburg, the 9995 is just the start of a new generation of devices originating from the Bedford plant.

New version

"A lot will be happening in the next year," Van Cuylenburg said, more or less confirming speculation that TI plans to produce a new version of the 9900 family in February.

Amplus is a TI software development system for the component software concept and it enables the user to modify standard software component packages. Available in January, it will run all future software and can incorporate the Amplus circuit emulator, if required. It is menu driven and can carry out foreground and background executions simultaneously.

In-circuit emulator Ampl has been designed to support multiple emulators and can be used for debugging multiple processing systems.

It provides a high level block structured language in which custom command procedures can be

and test besides using the standard systems.

Microprocessor Pascal (MPP), TI's concurrent version of Pascal, will eventually be incorporated in Amplus. Rx combines with the MPP run time support system to form the Microprocessor Pascal Executive (MPX).

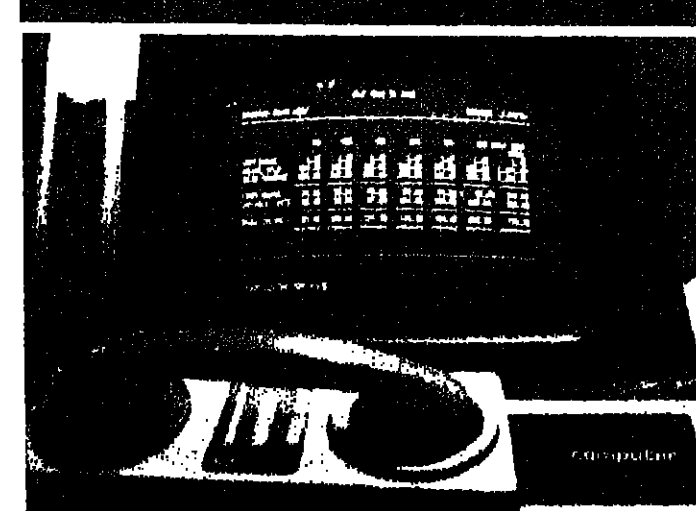
Pascal was chosen by TI primarily as a good design language and can be used either as design notation or as means of modelling and testing the function of the system on a host computer.

MPP can be used for syntax checking, documentation and testing.

TI is about to release MPP 3.0, a new version of Microprocessor Pascal, and the Rx-bug, a debugger based on the software real time executive.

by Eileen Stainer

MODEM FOR THE PET



COMMODORE has developed this modem facility for the Pet, which conforms to the recommendations used by the world's telecommunications administrations. The project is still in development and no release date has been set.

Motorola 64K EPROM in UK

THE Motorola 64K EPROM is now available in the UK from its UK distributor, Jernym of Sevenparks, Kent. Designated the MCM 68764, it features an auto-

matic power down mode to save power dissipation during standby operation, and has a maximum access time of either 350 or 450 nanoseconds.

CP/M floppy disc for Nascoms

GEMINI Microcomputers, the company founded earlier this year by ex-Nascom boss John Marshall, has made a CP/M floppy disc system available for the Nascom 1 and 2 microcomputers.

The floppy disc controller can support three drives, although the CP/M system uses only one or two double-sided single density five-inch drives giving 160K of storage per drive.

Existing Nas-Sys software can be used on the disc system without CP/M, called the D-DOS system. Both are available through seven newly-formed Gemini dealers situated in the Midlands, Surrey, the North-West, Bristol and London areas.

A CP/M single drive system for the Nascom 1 is priced at £460 plus VAT and for the Nascom 2 at £450 plus VAT. The double drive costs £650 and £640 plus VAT respectively. D-DOS single drive for either system is available for £395 plus VAT.

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Services hit by slump

From front page

Director of PRC based in central London will also continue unaffected.

Digital Equipment, which has already seen two OEMs, Gamma and Buzel Data Systems, go to the wall over the last year, described PRC as a "very minor" OEM in the UK.

But the run down of PRC means that Prime has lost the one dealer in the UK for its information system which combines an English-like language called Inform with its Prime operating system on Prime hardware.

A Prime spokesman said that a new dealer for information would be found in the New Year. Only a couple of information systems had been sold by PRC since their agreement was signed early this



NOLAN... sees DP as gaining dominance over company's structure.

his book of the same name, Nolan saw DP gaining dominance over a company's structure, with the various new technologies interlinked by a systems architecture.

The process would lead to the "demeaning" of the traditional monolithic DP department.

The driving forces behind these changes would be the growing need to increase productivity and the realisation that computers were a relatively inexpensive means of achieving this aim.

Examining the concept of the DP department as a company within a company Dave Norton, the consultancy's president, detailed the ways in which the DP operation justified being regarded as such, even more than older departments like finance, personnel or production.

The management of data as opposed to money, people or materials, involved dealing with the greatest impact on the rest of the organisation.

BT approval for Sematrans

EYE Business Communications of Cambridge, part of Philips, has won British Telecom approval for its 2,400 bps two-wire full-duplex 2424 Sematrans modem.

This is claimed to be the first such modem to gain British Telecom approval and means that full duplex transmission may be carried out over an ordinary dialled telephone connection.

The modem uses echo cancellation to achieve this with standard synchronous communication, asynchronous being optional. A range of Philips modems, covering speeds from 300 to

OP SPOT

Ops who chase the bankrolls of millionaires

THE Chase Manhattan bank deals with millionaires, large corporations, and other banks and an account there would say more about you than a wallet stuffed with American Express cards. Its City of London headquarters at Woolgate House is decidedly unimpressive and on entering the place you know you are in a hushed citadel of corporation land.

In the computer room on the eighth floor, life is more liberal and the atmosphere less intimidating. A slight feeling of panic may be engendered by the fact that all the proliferating hardware has just been moved to the same floor, having migrated from the first and tenth floors.

The move is part of a general centralisation of staff and facilities within London, and Chase shared Woolgate House with National Westminster until last year.

Hectic activity

Since then, the entire organisation has been involved in what is known as "restacking" the building. Eventually, all 1,100 of Chase's UK employees will be working there.

"Restacking" meant a month of hectic activity for the computer department preceded by 18 months of planning. Operations manager Jim Oates says: "We recognised from the beginning that the operations department would benefit from being closely involved with the move."

To that end, Clive Stamp was appointed operations supervisor with a brief to handle consultations with other bank departments and ensure that all details of the move were anticipated properly.

Stamp started with Chase as an operator on the Burroughs 3500 which lived on the tenth floor before being phased out two years ago.

The move itself took place over four weekends commencing on October 17 and it involved processors from four manufacturers: IBM, DEC, Vencat and Wang.

There is such a proliferation of kit on site because many of the

development and the buying decisions happen in the States. Production control co-ordinator Peter Wood adds: "It is not a good idea to be locked to one vendor."

The new computer room houses a 4-megabyte IBM 3031 running under VM OS/VS1 and CICs with mass storage handled by 16 3330 discs and a couple of 3350s.

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He writes: "Your predecessor Bernard Allen seemed to be well aware of the ridiculous derogatory opinion that exists concerning the status, value and position of operators."

"I was extremely surprised, therefore, to find you promoting, by way of your column, an action which could only give ammunition to those holding this view."

"However, I thought the item was intended to be, it is likely to be misconstrued. The idea that all operators are limp-brained, button-pushing monkeys is, without doubt, completely wrong but the 'If it doesn't work, fump it' insinuation will not assist in disproving these theories."

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Top of the Chase Manhattan operational tree are (left to right) ops manager Jim Oates, computer ops co-ordinator Clive Stamp and production co-ordinator Peter Wood.

by Paul Fisher

Stars and stripes illusions

FROM time to time an op smitten by wanderlust may contemplate a working trip to the United States, stimulated by diamonds as big as the Ritz or fantasies about breakfast at Tiffany's with Blondie.

Visions and expectations of riches beyond avarice may be bolstered further by reports of Texas ops posts with a house, car and manservant included in a superficially appealing package. Not to be taken too seriously, according to New York-based consultant Phil Dorn, who has been working in DP on both sides of the Atlantic since 1959.

"US computer operators are regarded by management in the same way as lathe operators and often stay in their jobs for 25 years," claims Dorn.

"Operations in the States," he continued, "attracts a different level of person, one without career



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In general, American management encourages long service by stimulating company loyalty and offering employees perks from the moment they join the company.

As an example of this technique, he quotes General Motors which gives all new employees discounts on company cars.

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HOW are operators selected for a job? Do ops managers look for a clutch of CSEs, time spent on a TOFS course or a doctorate in philosophy? Do they put their trust in aptitude tests, a track record or personal recommendations?

I overheard an ops manager saying recently: "What I look for is a bloke who can lift a heavy box of paper." This short but cautionary tale should bring joy to the hearts of all sexist who want to keep tape apes and printer monkeys dumb, masonic and simian.

PROGRAMMERS' PAGE

David and Goliath may kill off the programmer

COBOL programmers beware - again. The latest threat to job security comes from Adam, David, Goliath and Tina (tiny Adam).

This biblical bevy of systems, designed to strike an instant chord all round the world, comes from the stable of Lomac, Logical Machine Corp, of Los Angeles. They are introduced to the UK by Beam Microwest, of London, which claims to have cut out the whole of the middle-men of the DP department.

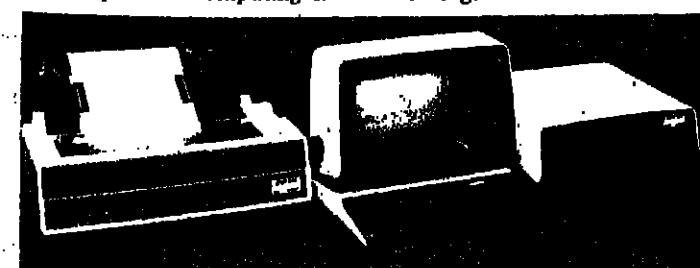
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IMAGINE being disabled, stuck at home and unable to get out even to work. Nice for a week, you may think, but imagine the growing sense of purposelessness and isolation from life.

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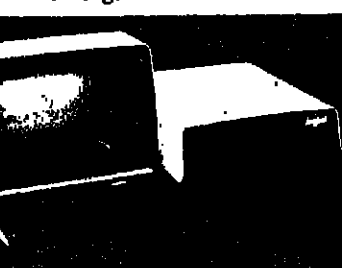
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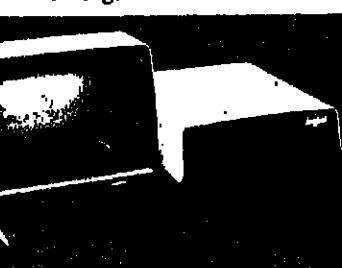
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"It's our policy to go out to a large selection of the users and ask them just what they want to go on to a computer," said Hillier. "In fact, the shipping people came to us - they challenged us to put together a system capable of giving alternative route costings, freight accounts, manifests and documentation."

"There is a lot of paper-shifting in the freight business, and doing it manually is clumsy and leads to all sorts of delays. That's where the computer scores."

Beam will supply its customers free with any of the packages already devised, but the beauty of the system is seen to be the ease and flexibility with which the customer can program and amend to

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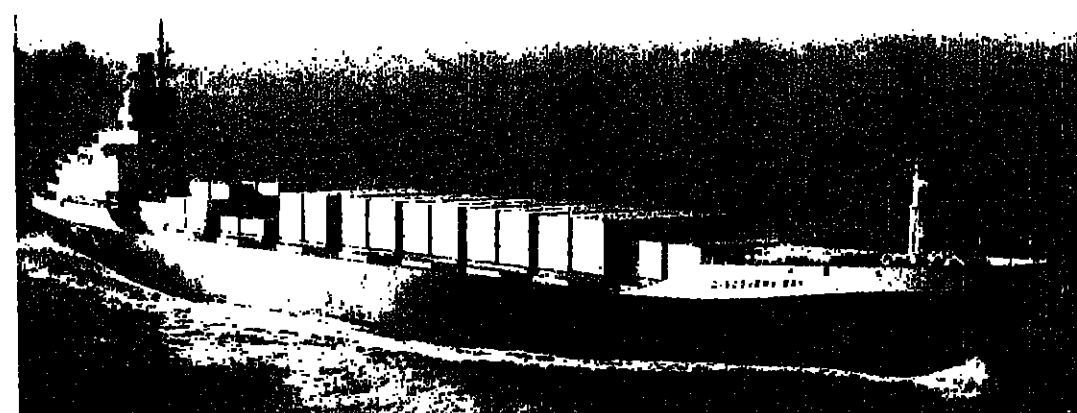
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OP SPOT

Ops who chase the bankrolls of millionaires

THE Chase Manhattan bank deals with millionaires, large corporations, and other banks and an account there would say more about you than a wallet stuffed with American Express cards. Its City of London headquarters at Woolgate House is decidedly unimpressive and on entering the place you know you are in a hushed citadel of corporation land.

In the computer room on the eighth floor, life is more liberal and the atmosphere less intimidating. A slight feeling of panic may be engendered by the fact that all the proliferating hardware has just been moved to the same floor, having migrated from the first and tenth floors.

The move is part of a general centralisation of staff and facilities within London, and Chase shared Woolgate House with National Westminster until last year.

Hectic activity

Since then, the entire organisation has been involved in what is known as "restacking" the building. Eventually, all 1,100 of Chase's UK employees will be working there.

"Restacking" meant a month of hectic activity for the computer department preceded by 18 months of planning. Operations manager Jim Oates says: "We recognised from the beginning that the operations department would benefit from being closely involved with the move."

To that end, Clive Stamp was appointed operations supervisor with a brief to handle consultations with other bank departments and ensure that all details of the move were anticipated properly.

Stamp started with Chase as an operator on the Burroughs 3500 which lived on the tenth floor before being phased out two years ago.

The move itself took place over four weekends commencing on October 17 and it involved processors from four manufacturers: IBM, DEC, Vencat and Wang.

There is such a proliferation of kit on site because many of the

development and the buying decisions happen in the States. Production control co-ordinator Peter Wood adds: "It is not a good idea to be locked to one vendor."

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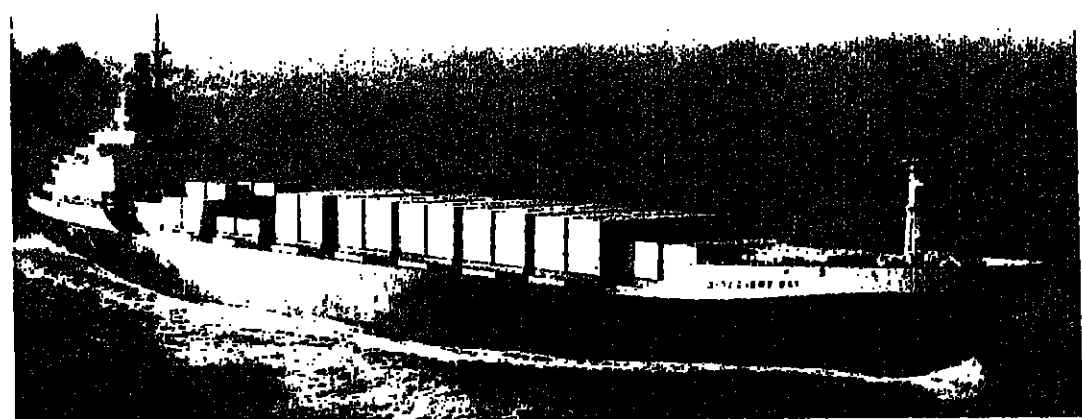
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Puzzler

IN this variation on the conventional Magic Square, the problem is to fill in the nine vacant cells, using the numbers 4 to 12, in such a way that (a) the four rows of four cells indicated by arrows, (b) the two differently shaded opposite-pairs of four cells each, and (c) the central group of four cells, all total to a constant of 26. To make the task more difficult, the first three digits in the 1 to 12 consecutive sequence have already been inserted in fixed positions.

See page 37 for solution.

Referring back to the October 23 Puzzler, several readers have worked out another 26-stroke minimum roped, using different optimum shot lengths of 75 and 175m. More details will be forwarded to interested parties on receipt of a stamped-addressed envelope.

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Section I – Part II

of our series describing a system design methodology
by Rosemary Rock-Evans

— SAYS CW'S CHILD CHESS PRODIGY

Among the games, poised to make another move against a micro, is 13-year-old Jaime Gorman.

The games people play

corrected the first two
replay but on the third
apparently lost his
all the men off his
titled Napoleon, who
er to have unnerved a

It was Johann Algaier,
ennese chess player
drened within the Box.
n's belief that he was
n, Algaier inflicted a
temporarily. I have never
olomon took his defeat
fident that he took it
on the rare occasions
the court beat him." It
one to a student and
importance of studies to
today. Schoolchildren
d it easier to accept
machine than from a
ay against machines
games can become
the player challenges
anyone else.

See Master Blaster
and, both sensory
instructory instru-
ments would be in-
credibly in a Court
mentally or physically
mpaired. Although com-
n make very attractive
n make direct sparring
in the side, computers

the Centre Court at Wimbledon than he is
in the classroom or the laboratory.

Key factors

Most games can be played at a variety of
level. It is not the intellectual content
of Space Invaders which initially disorgani-
sed and eventually revitalised the Japa-
nese coin-op industry to the extent of some
£300 million in a year.

What gave Space Invaders its obvious
pull? Novey, being the in-things and a
brilliantly orchestrated publicity campaign
were important components, as they were
with Othello.

Different but of equal importance are its
dynamic display and contemporary space-
age theme. All these are key factors in
determining the scale of Space Invaders'
success.

What determines the success or perhaps
the social importance of this type of game?
Space Invaders may allow one to identify
with Superman, with the Melkon ruling
the universe, but its real appeal lies in the
intense physical involvement which it gener-
ates.

Space Invaders is potent with feelings. It
calls on and stretches stimulus-response
skills which are deeply imbedded in man's
nature.

In time of war, it is these skills, given or
taken a little natural cunning, which have
determined survival in the past, whether
he were a private, a pilot, a pikeman or a
knight.

Computer tennis and football are no
substitutes for the real thing but when
fewer and fewer families have domestic
space for table tennis or billiards, they

PRODUCT NEWS INTERNATIONAL

Linking controller

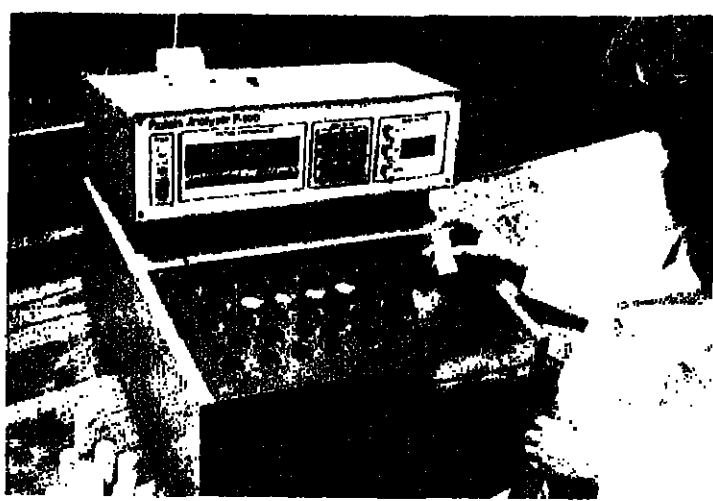
A CONTROLLER that links Shugart Technology's ST-506 micro-Winchester disc drive to host computers using the general purpose interface bus (GPIB), is available from Microcomputer Systems Corp.

Called the MSC-9305, its first application will be in systems incorporating the ST-506 disc drives and the HP-85 desktop computer. It enables systems designers to prepare applications software in the basic language, and permits thorough testing of incoming disc drives.

Each controller controls one ST-506 Winchester disc drive. The drive will be integrated, along with the host computer, into desk-sized dedicated systems for business data processing, scientific and industrial applications.

Self-diagnostic commands of the controller are claimed to reduce the time needed for troubleshooting, maintenance and repair. It costs \$700.

Microcomputer Systems Corp (CW), 432 Lakeside Drive, Sunnyvale, California 94086.



Protein analyser

AN INTELLIGENT protein analyser has been introduced by Newport Instruments.

Called the P100, it is a microprocessor-based Nuclear Magnetic Resonance (NMR) spectrometer. The instrument uses pulsed NMR with an aqueous "relaxation reagent". Relaxation rates are measured and correlated with protein content, which is then displayed on the LED. A thermal

printer simultaneously provides a hard copy record.

Samples are measured in 20ml plastic tubes. They must be finely dispersed, although not necessarily soluble.

The UK price is £7,000.

Newport Instruments (CW), Blakelands North, Milton Keynes, MK14 5AW. Tel: Milton Keynes (0908) 613691.

Block-mode CRT display terminal

A BLOCK-MODE CRT display terminal has been introduced by Hewlett-Packard. Called the HP 2624A, the model is claimed to fill the gap between the character-mode HP 2621A and the recently introduced multi-connection HP 2626A.

The terminal's editing and formatting features are claimed to improve data integrity and increase system throughput by preventing

entry errors, relieving the computer of several data-screening tasks.

The HP 2624A features user-definable, screen-labelled soft keys and a standard memory which will store four pages of 80-character lines. Five additional pages are optional. This means that large data entry forms, long listings or programs can be accommodated. The terminal has inverse video, half bright, underline, blink and non-display in any combination.

Options include the integral printer, which costs £631, additional display memory for £110, national character sets (English, French, German, Spanish, Swedish/Finnish and Norwegian/Danish) costing £55 and a maths and large character set also priced at £55.

The display terminal costs £1,510.

Hewlett-Packard (CW), 308-314 Kings Road, Reading, Berkshire, RG1 4ES. Tel: Reading 33RN. Tel: 0276 27105.

Reduced price learning module

HAWKE-CRAMER is supplying the Texas Instruments University Learning Module at the reduced price of £149 + VAT. Called the IM 990/189M, it has a 45-key alphanumeric keyboard and a 10 digit, 7 segment display with a 64 character buffer.

Hawke-Cramer (CW), Hawke House, Green Street, Sunbury-on-Thames, Middlesex. Tel: 09327 85577.

Destructor

A MACHINE for destroying microfilm has been introduced by Business Aids. Called the Scimitar Microdestructor, it reduces film to a fine dust, scuffing the emulsion off the film before cutting.

Destruction speed is 840 fiche per hour, or 98.4 inches of film per minute. All film, including polyester, diazo, vesicular and X-ray can be destroyed.

It costs £845. Business Aids (CW), 3 Whitby Avenue, London, NW10 7SQ. Tel: 01-886 9821.

Door lock

AN ELECTRICALLY-operated stronger door lock has been introduced by Clarke Instruments. Called Model 915, it replaces the fabricated Type 8093 series. It costs £45 plus VAT, with discounts on quantity orders.

Clarke Instruments (CW), 91A High Street, Camberley, GU15 3RN. Tel: 0276 27105.

Portable logging system

A SOFTWARE programmable multichannel data logging system is available from Microdata.

Called Prolog, the system is intended for use in automatic data acquisition over a variety of indoor and outdoor applications. It is portable and powered from internal rechargeable batteries.

Employing Microdata's input interface, the system can accept up to 100 mixed analogue and digital input signals from a mixture of any types of transducer in common use.

The mainframe unit accommodates 20 plug-in modules, so that

the instrument can function as a self-contained 20-channel data acquisition system in a single housing. When larger numbers of input channels are required, the capacity of the system can be expanded by the use of two add-on units, each capable of carrying 40 modules, giving a maximum of 100 channels.

Operating programs already entered can be recorded on a tape cartridge for use at a later date.

Microdata (CW), Moor House, Station Road, Radlett, WD7 8JX. Tel: 09276 3141.

Micro-based fault finder

AUTOTEST, the microprocessor-based data communications fault finder has been relaunched by Macwell Systems.

Features include a 20 character per line printer, time of day and elapsed time clocks, V24 signal facility when errors occur via RS 232C output and audio monitoring, including Transmim and Receive carrier dbm displays. It costs £1,480.

Macwell Systems (CW), The Maitling, Sawbridgeworth, CM21 9JX. Tel: (0279) 725650.

Designated Sidewinder, the drives are designed for Winchester disc drive back-up. They are available with either a basic or intelligent configuration, with 10 megabyte or 20 megabyte capacities.

The erase-write-read recording head operates in a two- or four-track format, the tracks being recorded serially one at a time.

The basic models cost \$469 for 10 megabytes and \$600 for 20 megabytes. Intelligent models are \$823 for 10 megabytes and \$954 for 20 megabytes.

Archival Corporation, 3,540 Cadillac Avenue, Costa Mesa, CA 92626, USA. Tel: (0101-714) 641 279.

A SERIES of bidirectional dot matrix impact printers is available from Techeport.

Called the DIP Series 80/Matrix Data Impact Printers, they feature a 7 x 7 or 14 x 7 bidirectional dot matrix, with printout speeds of 100 characters per second. They are offered with friction or tractor feeds and provide a Centronics compatible parallel interface, and RS 232C or 20 millamp current loop serial interfaces.

Using ribbon cartridges, the printers are fan-cooled and can operate a 100% duty cycle. They have an optional 1 or 2K buffer memory.

The printers cost from \$600 to \$800. Techeport (CW), 139 First Street, Cambridge, Massachusetts 02141, USA. Tel: (0101-617) 661 9424.

Users' calendar

A YEAR planner for computer users is available from Letts.

Called the Plan-A-Year range, the calendar features computer week and day numbers. Computer feed outs can be recorded on to the planners in digital form.

The planners cost £5.95 for the mounted version or £3.25 unmounted. There is a small Plan-A-Year, costing £1.85.

Charles Letts (CW), Dairy House, 77 Borough Road, London, SE1 1DW. Tel: 01-407 6891.

Keep structured programming simple for schools

IN 1980 there has been a spate of articles trying to show that structured programming is important for schools and colleges as well as for the computing fraternity in general.

This is both laudable and natural. It is a consequence of the growth of understanding and awareness, during the 1970s, of sensible programming techniques and styles.

The whole development is of course supported, and perhaps symbolised, by the rise of Pascal. But there are unfortunate residual impressions of abstractness, academicism and inelegance which the writers would probably criticise in a computer program.

Here they seemed to suggest with lots of little flowcharts that we are talking about something fancy and pedantic? Have they turned people off by talking about the Jackson approach using the design of data files? Is it really necessary to invent on propagate some of the ugliest words written in the language which computing shares with Milton and Shakespeare?

Abominations

The hypothesis of this article is that structured programming and methodical problem analysis are based on a few simple concepts which can be expressed in simple natural ways. Words like DOWHILE and DOUNTIL are unnecessary abominations. Further, if things are treated naturally and straightforwardly there is a merging of skills. Problem analysis, the development of algorithms, program design and coding use the same concepts and operation, so that from the very beginning pupils can become explicitly aware of just those ideas which they have always needed.

Three points will be argued: Firstly, there are just a few - about half a dozen - simple concepts which are the essential elements of both problem analysis and program structure. Secondly, there are just three correct relationships between these essential elements. Thirdly, once these few ideas are understood the analysis of a problem and the writing of a well-structured program are almost the same process.

In a language like Comal or Pascal the gap between the two processes is no wider than some trivial points of syntax, but the gap

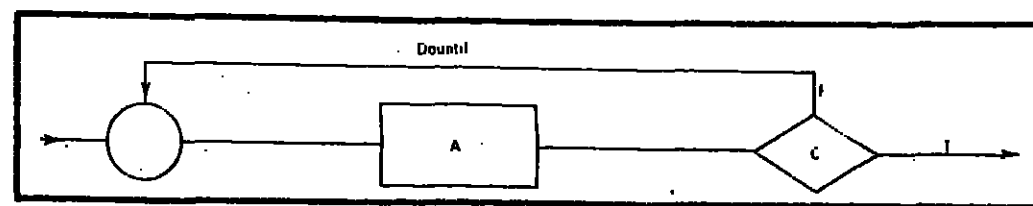


Figure 1. The hard way to explain a REPEAT/UNTIL loop.

does get wider with languages in the Fortran/Basic tradition. Writers like Hugh Williams and Sydney Leleux have tried to show how one should think, analyse problems and develop a program design using these ideas, and only as a final stage encode in Basic.

Complex

So far so good, but some of the above-mentioned articles give what the present writer feels is an unnecessarily complex view of things. For example, if the ideas are truly simple why are they explained in terms of flowcharts? The whole point of a decade's development is that flowcharting and GOTO statements are machine-oriented things, unnatural and largely unnecessary. Now, it isn't very hard to understand the flowchart shown (figure 1), from Structured Programming, though it seems a shame to make people read carefully to find the meaning of A, F, T, and C. And how do you pronounce DOUNTIL? The idea behind this is simply a loop with exit when a certain condition becomes true:

REPEAT
— (sequence of statements)
UNTIL (condition becomes true)

or as a rugby league player might put it:

REPEAT
— put one foot in front of other
UNTIL tackled.

Sometimes one wishes to construct a loop to provide for the possibility of the sequence of statements not being executed at all. The rugby player might receive the dreaded "hospital pass" which arrives at the same instant as a hard tackle. The WHILE construct allows for this:

WHILE you are not being tackled
— put one foot in front of other
ENDWHILE

The result is that Comal is both a language for problem analysis (what some people call pseudo-code) and an elegantly simple programming language. Moreover, it is designed and implemented (on SPC1 and RC Piccolo machines) as an extended Basic. So teachers and pupils will find it easy to move from Basic to Comal if and when their systems will allow it.

In Denmark, children in their early teens write well-structured programs in Comal. The explicit use of the six program elements and three relationships in the language has greatly facilitated their use in analysing problems.

The writer has experienced the ease with which the analyses of problems can develop on the blackboard in Comal, without

As Niklaus Wirth and others have observed, this is a more general type of loop and a powerful concept:

WHILE (reason for looping)
—
—
—
ENDWHILE

This is perfectly true, but it is not a reason for ignoring the REPEAT/UNTIL concept which is more natural in some situations and a little easier to use. In a computer context one has to be careful and precise but the ideas can be presented in a simple way. It is said that Niklaus Wirth observed with growing dismay the increasing complexity of the Algol 68 specification as his committee colleagues put more and more of their very clever ideas into it. He went away and invented Pascal (1970).

A further major simplification occurred from 1975 to 1980 when Borge Christensen, a great teacher as well as a scholar, achieved a combination of power and simplicity with Comal: the power of Pascal's structures combined with Basic's simple syntax and easy operating environment.

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The writer has experienced the ease with which the analyses of problems can develop on the blackboard in Comal, without

flowcharts. He can also report that his students find Comal a delight to use. It helps to reduce to a minimum what Dijkstra calls the conceptual gap between the static program (spread out in text space) and the dynamic process (spread out in time) of the program's execution.

The six essential elements of program structure are:

FOR loops
REPEAT/UNTIL loops
WHILE loops
IF/THEN/ELSE decisions (binary)
CASE decisions (multiple)
PROCEDURES (closed subroutines)

The essential relationships are:

Sequential (one thing after another)
Subordinate (nested structures)
Procedure calls (modularity)
Comal-90 provides for automatic indentation to help the programmer to read his program easily and to be sure that every structure has been properly opened and closed. Last, but by no means least, long (or short, if you insist) variable names are allowed to make the meaning of identifiers clear. A good implementation would also force keywords into upper case and user words into lower case (or vice versa).

Tree

There is a good deal more to be said. Only loops have been discussed in any detail. Decisions and modularity can be treated in equally simple ways. More needs to be said about graphs of algorithms: if flowcharts are out, what visual representation is possible?

The answer is again beautifully simple: a well-structured program is either a tree or a group of trees, and it can be represented as such so that the program elements and relationships are presented visually. Moreover, the "level" in the tree corresponds to the indenting in the program and if you are one of the few people who honestly does draw his flowchart or other

by Roy Atherton

Structured programming and methodical problem analysis are based on a few simple concepts which can be expressed in simple and natural ways, and words like DOWHILE and DOUNTIL are unnecessary abominations, says Dr Roy Atherton. Here he argues three points: that there are just a few simple concepts which are the essential elements of both problem analysis and program structure; that there are just three correct relationships between these essential elements; and thirdly, that once these few ideas are understood the analysis of a problem and the writing of a well-structured program are almost the same process.

The author is head of the computer education centre at Bulmershe College of Higher Education, Reading.

diagram first, then you can be sure that the program will almost write itself as you do a "natural walk" around the tree.

A word must be said about GOTO statements. They are necessary to these extents.

1. In a structurally deficient language (eg Basic, Fortran) the GOTO must be used to simulate missing structures in even the best-designed programs.

2. Even in structurally correct languages like Comal and Pascal, the GOTO statement is occasionally the simplest way to do something, such as exit from a nested structure on an error condition to abort execution.

However, it must be added that in the teaching of problem analysis, using Comal or some similar pseudo-code, GOTO constructs need come only very late in most courses. It is regrettable that they must be used in the actual Basic programs at rather earlier stages. They are extremely easy to misuse: they can and do cause much trouble.

Tangled up

In the tree-structure of a good program the GOTO statement is occasionally a necessary rope to get to the ground, or perhaps to another branch or another tree, by a simple quick method. But if it is used freely it can get the program and programmer so tangled up

Football manager's approach to problem analysis and the stored program concept

A PROGRAMMER's job is something like a football manager's. The manager must isolate certain concepts into his players so that when a game starts they play good football without further interference from him.

His job is to analyse the problem (football) and formulate a set of rules for play, after which he must "program" his players with these rules by training and coaching sessions. The following "program" is based on a somewhat simplified analysis of the game. It is in some ways more specific than a coach would be but its purpose is to illustrate good problem analysis using fundamental concepts which will be discussed later.

REMARK Football Manager's instructions to his Players. For half = one to two

REPEAT
WHILE the ball is in play
IF opponents have ball THEN
— play in defensive positions
ELSE
— pass safely to team-mate
— make good attacking opportunity occurs
— EXCHANGE attack
ENDIF

ENDWHILE
UNTIL half time or final whistle
— leave the field and go to dressing room
NEXT half

STOP
PROCEDURE attack
REPEAT
IF you have the ball THEN
— keep moving forward or pass
— into space to receive a pass
ENDIF
UNTIL ball is in penalty area AND shot is possible
— shoot
ENDIF

Note: All structures must be opened and closed.

Opening Keyword Closing Keyword
FOR NEXT
REPEAT UNTIL
WHILE ENDWHILE
IF ENDIF
PROCEDURE ENDPROC

What happens between the opening and closing keywords is the content of that structure. Structures may be properly "nested" or they may follow in sequence.

Figure 2: An attempt to convey this aesthetic quality of a well-structured analysis of a problem without having first explained all the concepts in detail, using the actual keywords of Comal.

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Charles Letts (CW), Dairy House, 77 Borough Road, London, SE1 1DW. Tel: 01-407 6891.

Robots aid the ailing Chrysler

CHRYSLER Corp recently completed installation of 130 Unimation welding robots in two of its car manufacturing plants. The installation, which took one and a half years, constitutes the largest single order of industrial robots in the US.

Sixty-five of the Unimation robots were installed in Chrysler's Newark, Delaware plant, and the other 65 were placed in the company's Jefferson Avenue factory in Detroit, Michigan. Both sites now manufacture Chrysler's K-body cars, new models which the company hopes will boost its ailing financial health.

The K-body cars, the Plymouth Reliant and the Dodge Arjes, are relatively small cars with gas mileage rates that are very good for US production - between 25 and 41 miles per gallon.

Of the 130 robots, 126 are Uni-

mation's 4000 Series Unimate robots, equipped for automobile body welding. The remaining four are Unimation's 2000 Series robots. These much smaller machines will be hung from the ceiling. They, too, are used for welding, but in places where there is less room on the assembly lines for additional machinery.

The welding robots will perform about 98% of all spot welds on the new cars. On sedans, there are some 1,736 spot welds to be made; the Chrysler station wagons receive some 1,656 welds.

According to Chrysler, the company intends to use even more robots in the future. The main advantage to using the machines is that they are programmable; it

A big expense in automobile

manufacturing is "cosmetic" changes. With fixed automation, you have to build new machines every time you make a change. But with robots you reprogram them. And when you bring in new robots, you can program them so that they are co-ordinated with the older machines.

Chrysler installed its first Unimation robots in 1975, when it began using the machines in the manufacturing of its Dodge Omni and Horizon autos. Last year the company had about 200 robots in its various plants. By comparison, the other two major US car manufacturers, General Motors and Ford Motors, had 225 and 250 robots respectively that year.

Chrysler ordered the robots from Unimation in February, 1979. But deliveries were spread out, and the last robots were installed in late August.

Chrysler hopes the robots will help it manufacture more cars, more cheaply. The company is now in serious trouble. It is expected to lose \$1 billion this year, and depends on the US government's loan guarantee programme.

A big expense in automobile

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Surrey

c. £12,000 p.a.

We are seeking a real expert in real-time, process control systems development. This post will be a crucial one to our client, since the responsibilities covered by the individual appointed will be very wide ranging. They include giving in-depth technical support to the Sales force, thus ensuring that the skills and capabilities within the company are utilized to the fullest extent, acting as Consultant to existing and future clients, and managing project teams both directly and indirectly. In the medium term, expectations are that the appointee will take part in the company management.

The company is a well established and steadily growing specialist consultancy and can offer long-term security and career progression for the right candidate. A company car may form part of the package if the right level of person is appointed.

Consultants: — Mike Creamer or Andy Wright
If the advertised positions do not match your experience or aspirations, Mike and Andy are always available for a confidential discussion of the possibilities. An informal meeting — often an essential part of the process — can be quickly arranged.

Control (R/T) Software Development

Developing new, software driven industrial control systems.

Slough

£7,500-£12,000

This company is a superb example of how enlightened management in British industry is taking decisive steps into the eighties, redesigning the product range to utilize real-time micro based systems technology to the full.

The new software team will fit into the existing organisation, reporting to the Software Design Manager — also a recent recruit. Vacancies therefore exist from Team Leader level down to Programmer/Designer. At this stage, minimum experience required is 2-3 years and must cover as many of the following as possible: INTEL 8080; H/W-S/W interfaces; 8080 ASSEMBLER; PLM; IC80/MDS; RMX86; real-time systems; distributed control software.

Modus also has process control opportunities in other areas — e.g. Hampshire, Surrey and Central London — at both Senior and Junior levels. Enquiries naturally welcomed.

Multifunctional Micro Software

Developing a wide range of software from networking to text-editing.

South Herts.

c. £8,000 + + +

This company has gone from strength to strength in recent years, selling and supporting increasingly sophisticated micro systems, based on both INTEL & TEXAS microprocessors. The software staff can be involved in developing or enhancing software covering a vast range of systems, including distributed processing, text management, emulation, etc.

Candidates for these software programming and design positions must have between 2-5 years experience of Assembler level processing on either minis or micros. Most importantly, applicants must be self-reliant individuals, ready and willing to get involved in a variety of functions. "Small company benefits" include an extremely valuable bonus scheme and possibly a company car after a period with the company.

Project Leader +

Analyst/Programmers

On-line, database systems development for a 4341 machine.

Hounslow, Middx.

£7,500-£11,500

One of the largest and most successful companies of its kind in Europe, our client offers both a superb technical environment and long-term security and job interest.

The requirements for systems staff all have one common denominator — CICS systems design experience. The company has a new 4341 and intends using not only CICS, but also the DL/I database — for which full training will be given.

The salary range quoted above reflects the need for a variety of people, from Analyst/Programmer with 2-4 years experience to Project Leaders with 8-8 years in the industry. Excellent career opportunities with thorough training and career development schemes.

OR Programmers & Analysts

Multipurpose systems group within a major oil company.

West End

£7,500-£13,000

A small but expanding multidisciplinary group offers an ideal opportunity for dedicated OR practitioners to develop their particular skills and experience in challenging and exciting projects.

Applicants must possess a good class numerate degree, be totally fluent in FORTRAN programming and have recent in-depth project involvement; in other words, they are not just seeking FORTRAN Programmers from an OR environment. All candidates will be provided with a full job specification for the vacancies which range from Programmer to Project Leader level.

MYRIAD

NEW INSTALLATION

IBM 4431

SYSTEMS DEVELOPMENT

MANAGER (Designate) TO £11,000

This is an ideal opportunity for a SENIOR ANALYST to progress into a managerial role, coupled with internal consultancy duties, on both mainframe and micro equipment. Reporting to the DPM, the person appointed will have a sound analysis background, including project control experience, and be responsible for supervising the development and implementation of various commercial applications. A knowledge of on-line systems and IBM software will be particularly useful as the work will involve the introduction of real-time facilities in first-time user departments.

SENIOR PROGRAMMER

TO £10,000

To head the programming team, this person will have written extensively in COBOL, probably using structured techniques in an IBM OS environment. On-line and/or micro experience will be an added advantage but full training will be given in these areas.

PROGRAMMER

TO £7,500

The successful applicant will have programmed in COBOL for 2 years and will now be seeking a wider role within a highly respected organisation. Displaying enthusiasm and resourcefulness, the PROGRAMMER will develop and implement a variety of applications working with the minimum of supervision.

CENTRAL LONDON

The new mainframe will initially run systems transferred from the New York office and significant development is envisaged to incorporate on-line techniques. A limited amount of travel to the U.S.A. is likely and each position offers a challenging opportunity to participate in planning the future DP requirements for the U.K. operation.

Our Client is a major international, financial organisation with approximately 20,000 employees world-wide. They are able to provide first-class conditions of employment and are based in luxury offices close to several main-line stations.

REF: SI/1112/CW

MOVE INTO MARKETING

NORTH HAMPSHIRE

£6,000-£9,000

Data Communications is becoming ever more important to the computer industry and is probably the fastest growing sector of this vast marketplace. Our client is the world leader in data communications offering products in an international arena.

The Marketing Group is largely responsible for ensuring the continuing and increasing success of the company's products through four principal tasks:

- ★ Maintaining an awareness of the market and defining product requirements.
- ★ Liaising with engineering during product development.
- ★ Ensuring effective introduction of products to the marketplace.
- ★ Providing continuous support to the sales team.

A number of vacancies exist at all levels for people with relevant technical and/or commercial knowledge to move into this interesting and demanding area.

Experience in one or more of the following areas is required:

- ★ Data communications
- ★ Data processing
- ★ Digital electronics
- ★ Marketing of high technology products

The rewards are high and include:

- ★ Excellent commencing salary
- ★ Five weeks' annual leave
- ★ Relocation assistance
- ★ First-class career progression

To discuss the potential of these positions telephone Myriad now, or write quoting reference SW1/1112/CW and we will contact you with further information.

MYRIAD APPOINTMENTS LIMITED

30 Fleet Street London EC4Y 1AA Telephone 01 353 0981 24 hours

(3829)

604/1112/CW

MANAGEMENT & EXECUTIVE SELECTION

telephone 01-637 9611

**It's skill, drive
and judgement that
make a leader...**

Project Manager to £12k London

Our clients are market leaders in international transportation systems. They are investing in an advanced information systems strategy to support planned future growth.

They are currently completing their management team which will be responsible for the Northern hemisphere systems development program. The project manager will lead a team developing and implementing applications for their corporate operations.

Candidates for this position will be information systems professionals with a track record in the systems and project management fields. As the systems to be developed will be of a corporate information nature, experience of telecommunications, message switching and word processing is desirable.

Benefits commensurate with a large international company include BUPA, four weeks' holiday and salary to £12K.

For further information contact Diane Oubridge on 01-637 9611.

MANAGEMENT & EXECUTIVE SELECTION

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

SOUTH AFRICA

The Barlow Rand Group, one of South Africa's largest group of companies, is seeking DP Professionals to join its expanding Computer Services Division.

- * Consultants—up to R26,000, plus car
- * Account Managers—up to R26,000, plus car
- * Installation Managers—up to R26,000, plus car
- * Project Manager—up to R22,000, plus car
- * Systems Analysts—up to R20,000
- * Analyst/Programmers—up to R18,000
- * IBM DOS Software Programmers—Negotiable, depending on experience

Fringe Benefits are good and assistance with relocation will be provided

Barlows Computers Services have a large variety of hardware. Nearly every conceivable IBM Mainframe can be found at one of Barlow's installations. There are 3031's, 4341's, 4331's and 370's—some System 34's, Data General mini's and an Advanced System 5000.

If you care to bathe in the sun, improve your standard of living (eg, taxation on the above at below 20%), progress in your career, please contact Anne Breuer for further information at the following address:

Prescot Computers Limited
43 Conduit Street, London W1R 9FB. (01) 434 2698/9

(3851)

JBA

Customer Support Executives
Financial Packages & Word Processing
Bristol £6000—£9000 + benefits

A Systems House specialising in the provision of a range of services to accountancy practices is seeking additional staff. Two executives to support and expand Financial Packages and one to offer pre and post sales support on their Word Processing System. Candidates for the financial package position will have 2/3 years DP background with a strong financial bias and may be qualified accountants. The word processing executive will have a genuine interest in this field and an ability to identify and solve business problems. **Contact: Bob Male**

Analyst/Programmer
Bristol £6000—£9000 + benefits

Our Client, a leading Systems House marketing accounting services, have a vacancy for an Analyst/Programmer to develop new and expand existing Financial Packages. A knowledge of DEC hardware, Basic and RSTS will be valuable but a thorough understanding of financial applications is essential. **Contact: Bob Male**

MVS Expert

Birmingham £10,000 +
Our client is a large, multi-national organisation with extensive and advanced computing facilities. The hardware and software involvement is technically very challenging involving an international network, several mainframes and large IMS data bases. A senior vacancy now exists for a specialist with managerial ability to take responsibility for the systems software function. The job will call for a high level of technical involvement as well as some international travel. Applicants should have a solid technical background based on large IBM mainframes with specific experience of the MVS operating system. Familiarity with JES 3, TSO and IMS would be an added advantage as would a knowledge of French, German or Italian. **Contact: Bev Stevens**

Senior Systems Analyst

Kenilworth c. £9250 + Paid Overtime

Our client has a really interesting and unusual senior opportunity involving: **DEVELOPMENT OF A MAJOR NEW SYSTEM**
ADVANCED IMS DB/DC TECHNIQUES
INTERNATIONAL TRAVEL OPPORTUNITIES
FIRST CLASS SCOPE FOR CAREER DEVELOPMENT
Applicants should have a sound education with at least 3 years systems analysis experience. Familiarity with large IBM and engineering environments is desirable but good, fundamental systems analysis skills are much more important. **Contact: Bev Stevens**

Computer Auditor

Central Birmingham c. £9000 + Benefits

Our client, one of the foremost finance organisations is looking for a confident, self-starter to join a team in their Computer Audit Department. Applicants will have had 3/5 years experience in analysis preferably associated with IBM hardware. As well as independently auditing current systems, the successful applicant will be expected to provide systems assurance on a variety of developments including Data Base, On-Line and Communications systems; knowledge in these areas is advantageous. A skilled communicator with an ability to produce concise and well written reports will find significant promotion prospects within the organisation. Normal finance sector benefits together with relocation assistance are available. **Contact: Christine Pountney**

Senior Programmer

Rugby c. £8000

An engineering organisation, forming part of a larger international group, is seeking a Senior Programmer to play a leading role in a major systems development programme. The installation is technically up to date with opportunities to be involved in projects using data base, on-line and telecommunications techniques. Applicants should have at least 4 years IBM COBOL programming experience, preferably using DOS, combined with the ability to lead a team. A knowledge of CICS and/or DL/I would be an advantage. **Contact: Bev Stevens**

Scientific Programmers

Tewkesbury £ Negotiable

Radiol Redac Ltd are recruiting a number of programmers to satisfy their significant development plans. The Company is recognised as one of the world's leading organisations in the field of Computer Aided Design. Hardware ranges from microprocessors to the DEC VAX, all dedicated to producing highly advanced systems aimed at fulfilling this expanding world market. Applicants will hold a degree or equivalent and will be able to demonstrate consistent advancement in their present environment. Opportunities exist for both Development Programmers and Customer Service Programmers, each area offering a real challenge to candidates capable of defining and solving problems. Radiol Redac Ltd, offer competitive salary structures, significant fringe benefits, an informal but highly professional working environment and an excellent location. Relocation assistance will be available in appropriate cases. **Contact: Bob Male**

JAMES BAKER ASSOCIATES,
International Personnel Consultants,
Gateway House, 50 High Street,
Birmingham B4 7SY
Tel: 021-643 7865

(3850)

MCS

Management Control Systems

the established independent software and systems company need experienced people to work on the specification and development of on-line commercial systems, particularly in the areas of Distribution and Manufacturing.

You will be working in pleasant offices at Ealing, where we have our own PDP11 machine dedicated to development.

You will also be eligible for car options, profit share and pension scheme operated by the company.

Analyst/Programmer
UP TO £10,000

Age 26+, Minimum of 3 years' experience in on-line commercial data processing including Applications Analysis and Programming, using Basic preferably on DEC PDP11 computers.

Programmer
UP TO £8,500

A minimum of 1 year's experience is required on PDP11 hardware, RSTS and Basic Plus.

Please write with your CV to:

Management Control Systems

4th Floor, Bilton House, 54/56 Uxbridge Road, Ealing, London W5 2TJ.
Or telephone (reverse charge) 01-840 3292

(376)

SALES EXECUTIVES
MIDLANDS AREA

TURNKEY MINI-COMPUTER SYSTEMS
EARNINGS PACKAGE CIRCA £20,000 + CAR

The continued success of **SYS-COM COMPUTERS** in becoming one of the largest Systems Houses in the U.K. enables us to expand our sales force.

Experienced mini-computer salesmen are required to augment the existing highly successful sales team. We offer a stimulating working environment where the individual's contribution plays a significant part in the company's growth. As a successful individual in a highly professional company, an attractive earnings package will be provided commensurate with your and our success.

The general terms of employment are well above average, including BUPA, Pension Scheme, Life and Sickness Insurance, five weeks' holiday and company car.

For a confidential discussion please contact Mike Hassan, Ref. CW291.

COMPUTER PERSONNEL CONSULTANTS
18th Floor, The Rotunda
Birmingham B2 4PA
021-632 6848

(3768)

BRUNEL UNIVERSITY
ADMINISTRATIVE COMPUTING MANAGER
(no advertisement)

Applications are invited for the post of Administrative Computing Manager (previously Data Processing Officer) in the University Central Administration. Applicants, who should possess a University Degree or equivalent qualification, must have experience of systems analysis. The successful candidate will be responsible to the Secretary General for development and maintenance of computer systems for the Central Administration.

Salary within the national administrative grade II scale £22,200-£11,875 (under review) plus £967 London Allowance.

Write for application form and further particulars to the Personnel Secretary, Brunel University, Uxbridge, Middlesex UB8 3PH, or telephone Uxbridge 371165 extension 49. Closing date: 8 January, 1981.

(3866)

THE UNIVERSITY OF MANCHESTER
CHAIRS IN COMPUTER SCIENCE

Applications are invited for two Chairs in the Department of Computer Science. The other chair in the Department is held by Professor D. B. G. Edwards (CIC Chair in Computer Engineering). The successful candidate will be responsible for the development of the Department in Microprocessor Applications in its teaching and research in the field of Computer Science.

Consideration will be given to candidates with an industrial or academic background who may be active currently in research in any field of Computer Science. Some possible fields of interest follow but the list is not intended to be exhaustive or to imply any order of priority. Additional responsibilities: Computer Data Processing, Computer Aided Design, Computer Architecture, Computer Networks, Robotics, Theoretical Computer Science. Applications (2 copies) should be sent to the Chair of Computer Science, The University of Manchester, Oxford Road, Manchester M13 9PL. The closing date for applications is 15 January 1981. The University of Manchester is an equal opportunities employer.

(3769)

Targa

DATA BASE ADMINISTRATOR to £12,000

A well-known Company, based South of London, require a Data-Base Administrator for their large computer site. The company use IBM 370/158 & 3031 mainframes running under OS/VS1 & MVS respectively. The successful applicant will have extensive knowledge of programming on IBM equipment and currently be at least a SENIOR PROGRAMMER who has good experience of Data-Base Systems. Ref. 3164.

ANALYST/PROGRAMMER £6,000

A company based in South London require an Analyst/Programmer who has at least one year's good commercial experience gained in Hewlett Packard machines utilizing FORTRAN. The successful applicant will also be required to have an "A" level pass in Mathematics. Very friendly company with pleasant working conditions. Ref. 3170.

TERMINAL OPERATOR £5,500

A City based company have an URGENT REQUIREMENT for an Operator to work on an IBM 8100 (DPC) terminal, which is linked to an IBM 370 mainframe in the USA. The specific requirements for this position are: a good understanding of IBM systems especially DOS/VS, knowledge of RJE and the ability to perform House-Keeping and File-Maintenance procedures. A very easy two shift system is in operation. Ref. 3168.

OPERATORS (Various) £6000

Vacancies exist for all levels of Operator for a Company based South of London who use IBM hardware utilizing OS/VS1 and MVS. The current configuration comprises 370/158 & 3031. A standard 3-shift system is in operation. Successful applicants can expect a very good salary and many chances of career progression. Ref. 3162.

PDP11/70 SHIFT LEADER, S. LONDON HIGH-NEG.

Our client a large well known concern in S. LONDON is currently looking for an experienced OPERATOR or SENIOR OPERATOR with at least 2 years' plus current experience using a PDP11/70 running under RSX11. You should be of smart appearance, able to demonstrate your supervisory capabilities/skills and be able to motivate staff under you. Benefits for this position are superb, namely, sub. mortgage, NCP, BUPA, L/A, STL and LV. Ref. 3166.

ICL SYSTEM 4 OPERATOR, S. LONDON to £6,300

Based in S. LONDON our client is looking for an experienced SYSTEM 4 operator. If you have between 1-4 years' experience on SYS 4 and would like to progress our client would like to hear from you. There are possibilities in the future of moving onto their larger 2800 systems. The company also offer a first-class benefits package. Ref. 2268.

TARGA COMPUTER SERVICES

46/47 LONDON WALL
LONDON EC2M 5TE 01-638 6381

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U-C-A

SEASONAL GREETINGS TO YOU ALL

SALESMEN SALESMEN SALESMEN

London & Home Counties to £20,000 Q.E. + car
An established market leader wishes to expand his penetration of the mini-micro market by establishing Senior Salesmen to take charge of existing accounts whilst obtaining new business. A real chance to match your efforts with reward and managerial promotion after a reasonable period is well on the cards.
CW50/1 Michael

RECRUITMENT CONSULTANT

W4
UCA are a well-established recruitment consultancy with an excellent reputation within the computer industry. We now wish to appoint an applicant with a computer background and with a good outgoing personality to handle our increasing permanent and freelance client business. It is unlikely the successful candidate will be under 25 years of age.
CW 50/2 Michael

CONTRACT PROGRAMMER/ ANALYSTS

to £450 p.w.

ICL	2550 DME COBOL	Sussex	3 mths.
ICL	2800 IDMS VMEB	Berks.	3 mths.
IBM	COBOL JCL PROG.	London	3 mths.
IBM	COBOL/ASS. SYS. PROG.	Manchester	6 mths. +
IBM	COBOL CODING PROG.	W. London	3 mths. +
IBM	ASS/COBOL CICS	Holland	6 mths.
VENTEK	DATABUS	Holland	5 mths.
IBM	SYS. PROG. CICS VSAM	America	6 mths.

Phone Irene for details

UCA Recruitment Consultants
Universal Computer Associates Limited
Data Express House,
01-995 3883 Prospect Place, London W4 3BR
(01-958 8138 Evenings)

Edinburgh Regional Computing
Centre

ASSISTANT TRAINING OFFICER

The Centre exists to provide computing services to Edinburgh University and other users in the Edinburgh area. The main service is based on an ICL 2980 and 2972 running under the Edinburgh Multi Access System. In addition there are many mini and micro computer systems located in departments.

As part of its support to these services, the Centre has a Training Unit responsible for providing courses for users. To meet the need for additional course material, particularly in aspects of distributed computing, a further Assistant Training Officer post has been created. Applications are invited from graduates or those holding a comparable qualification, who have at least two years' experience of computing including use of interactive systems. Experience of teaching would be useful but it is not essential, and an aptitude for helping other people use computers is more important.

The post is on the Assistant Computing Officer grade, with salary in the range £4785-£5185 (under review) with superannuation under USS. For further details and an application form write to the Secretary, University of Edinburgh, Old College, South Bridge, Edinburgh EH8 9JH. Closing reference 70260, to whom completed forms must be returned by 23rd December, 1980.
(3884)



THE DIRECTORS
AND STAFF OF
NELSON COMPUTER
SERVICES WOULD
LIKE TO WISH ALL
OUR CUSTOMERS
AND FRIENDS A
VERY HAPPY
CHRISTMAS AND
PROSPERITY IN THE
NEW YEAR

IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY

SYSTEMS ANALYST

ADMINISTRATIVE COMPUTER UNIT

Applications are invited from experienced Systems Analysts to assist with the further development and integration of the College's Central Administration Computer Systems. Experience in the finance field advantageous. Salary in Administrative Grade 11 Scale £9,220-£11,676 per annum (under review), plus £987 London Allowance. Superannuation under USS. Five weeks' annual leave.

Further particulars and application form from the Personnel Secretary, Imperial College, South Kensington, London SW7 2AZ. (Telephone 01-589 5111, extension 2003). Closing date 8th January 1981.
(3877)

SALES EXECUTIVES

Required for Multinational Computer Manufacturer in the Midlands and North for their extensive range of

MICROPROCESSOR BASED SYSTEMS AND PERIPHERAL AND HARDWARE

Proven sales record in Peripherals, Office Systems or Mini required

High basic and realistic on quota earning are £15K-£18K with car and benefits

For interviews in Manchester or Birmingham Telephone immediately quoting Ref JVB/JB
(3872)



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المؤسسة العامة للبتروال QATAR GENERAL PETROLEUM CORPORATION

OPPORTUNITIES IN A NEW COMPUTER INSTALLATION IN THE MIDDLE EAST

QGPC established by the State of Qatar with a Share Capital of QR 4 billions (\$1.2 billion) has the responsibility for Petroleum and other related industries in the State. The Corporation is setting up an information and Computing Centre to provide computing services to QGPC and its subsidiaries in both Finance/ Administration and Engineering areas.

We are looking for Computer professionals for the following posts:

SYSTEMS DEVELOPMENT MANAGER

To lead a systems and programming team responsible for design and implementation, maintenance and support of new and existing Financial/ Administrative systems. Applicants must have gone through programmer/analyst/project leader career progression spanning at least nine years and must have significant experience in the maintenance and costing of systems implementation.

SYSTEMS ANALYSTS

These positions require a minimum of four years' systems and two years' programming experience in the area of Finance/ Administrative applications ideally obtained in an IBM DOS COBOL environment and must have controlled at least one major project through to implementation.

ANALYST PROGRAMMERS AND PROGRAMMERS

A minimum of three years' commercial IBM 370 DOS/VS COBOL experience is required and for Analyst programmers an additional one year of systems analysis and design.

For all above posts minimum requirement is a University Degree or equivalent, proficiency in English is essential. A second language (Arabic or French) would be an advantage.

WE OFFER

- Competitive salaries. No local income tax.
- Free furnished air-conditioned accommodation.
- Electricity and water are provided at no cost.
- Interest free car loan plus car allowance.
- Air tickets to country of domicile for employee, wife and up to three children.
- Free state medical services.
- Contributory life and accident insurance.
- End of service benefits.

Applications, listing name, address, qualifications, experience to date, previous employers and positions held, present employer, salary, position and expected salary as well as any other relevant information should be sent to:

Personal and Training Manager
QGPC,
P.O. Box 3212
Doha - Qatar
Arabian Gulf

All applications will be dealt with promptly and in strict confidence.

JBA

Telecommunications Specialists Switzerland To SF 72000

Experience gained of working on the development, modification and implementation of several elements of a System X network, is very much in demand by our client, who is a fast expanding member company of an internationally recognised electronics organisation.
To qualify for consideration, Analyst/Programmers and Project Leaders, must have between 2 and 4 years intensive experience of Real-Time Telecommunications systems, the essential ingredient of which must be a good knowledge of Assembler. A background acquired in software or electronic design aspect, is acceptable, providing a communications application is a dominating feature. If you feel you can contribute in this area, have a good command of German (an essential requirement), and are considering spending some time on the Continent (2 years), then call to discuss the possibilities.
Contact: Margaret Stevens

Sales Consultant

Essex Based c. £12k + Car
A leading, nationwide bureau orientated organisation, are seeking an experienced Sales Executive to assist with current expansion plans and develop his own geographical area. Covering North and East London, plus Essex, you would be responsible for selling the bureau's wide range of services, including application packages, terminal enquiry facilities and bespoke software. Main qualities sought are, a computer background with some accountancy exposure, plus a good sales record in a related field. Energy, initiative, and the will to succeed, are equally important. Basic + commission + car.
Contact: Brian Postles

Senior Service Engineer

London c. £9,500 + Car
A highly respected mini-computer Company wishes to recruit an experienced Engineer for commissioning and maintenance work in the above location. Practical knowledge of mini-computers would be desirable but is not essential, as full training will be provided as appropriate. Successful applicants must possess sound business sense and the ability to act in a thoroughly professional manner. This position offers excellent career prospects for the right person.
Contact: Jim Baker

Analyst/Programmers (BASIC + 2) City to £9,000

Our Client, an interesting and unusual financial organisation, is looking for experienced Programmers to join them at a time when they are installing two PDP 11/70s. A minimum of two years experience of BASIC + or BASIC + 2 language from a financial or commercial environment, together with a knowledge of commodities and DEC hardware would be a definite advantage. The ability to understand users and their problems is essential. Good salaries and generous benefits are offered to successful candidates.
Contact: Janet Chilvers

Systems Programmer

East London £9,000
One of the U.K.'s largest transport service organisations need an experienced person to join their data centre and play a major role in the development of operating systems. It is essential to have at least two years experience of IBM 370/150 running under OS using MVS/CICS. It is planned to upgrade the hardware in the near future, therefore a great deal of conversion work will be involved. Opportunities within the Company are excellent, along with good working conditions and Company benefits.
Contact: Janet Chilvers

Senior Programmers

City Up to £9,000
Our Client, a world-wide insurance organisation, is embarking on a major programme of new applications development, and is seeking two experienced programmers to join established project teams. Candidates must have had at least 3 years programming experience, with exposure to medium or large systems. A sound knowledge of IBM COBOL and of OS or DOS/JCL is essential.
Contact: Isabel Bruce

Programmers

Wembley Park Up to £9,000
A distributed multi-national company based in Wembley Park are currently developing an HP3000 system and so require a number of Programmers to support their teams. Candidates should have at least 2 years experience of COBOL programming, preferably gained in an HP3000 environment. Previous experience of Real-Time would be advantageous. Comprehensive training will be given in a number of areas. Usual large Company benefits apply.
Contact: David Hendry

JAMES BAKER ASSOCIATES
International Personnel Consultants,
32 Savile Row, London W1
Tel: 01-499 9311

Manager Computer Department

West London c. £10,500 + bonus
+ attractive Co. car

Our client, a major importer and supplier of a wide range of vehicles to the U.K., is seeking a manager for their established computer department. This attractive position will appeal to experienced managers who do not see such a positive future with their present companies, or to experienced analyst/programmers who may be acting as deputy managers in their present position and who are being held back awaiting promotion.

You will have good personal communications skills and the flexibility to slot into an existing management team.

Responsibilities:

The day-to-day running of a computer services department providing program development and maintenance, operations, data preparation and administration with a staff of approximately 12 people. The successful candidate will also be responsible for the eventual smooth transition from the present equipment to a 4300 installation at some future date.

Equipment:

384K IBM System/3 Model 15D
3741 Off-line communications.

Systems:

Parts stock control
Unit distribution
Warranty claims
User department enquiry under CCP.

Experience:

Essential — RPGII and previous commercial systems/ design and development. Desirable — DOS/COBOL in a 370/4300 environment, telecommunications.

The Company offers attractive benefits, non-contributory pension, free life insurance and a good bonus scheme.

If you would like to be considered for this position please contact me as shown below.

(3823)

Apply in confidence to Terry Harvey by sending personal and career details, or contact him for an application form, evenings GL Missenden (02406) 4703 or daytime as below.

HR Harvey Recruitment

Executive and Computing Personnel Consultants
500 Chesham House, 150 Regent Street,
London W1R 5FA. Tel: 01-734 5351

Systems Programmer— B6800

A vacancy exists for a Systems Programmer with special interest in very large mainframe computer systems. The Engineering Department's B6800 is one of three at the Cumberland facility and is used by up to 100 programmers and engineers via terminals. The person appointed would be responsible for developing programming tools; installing new levels of B6800 system software; providing assistance and advice to both users and in-house hardware maintenance engineers; troubleshooting software systems problems. The position will require liaison with Burroughs facilities in the USA and may involve occasional foreign travel.

Applicants should have at least two years experience of systems programming or software support on large computer systems.

Burroughs is an international company with a reputation as a technological leader. The B6800 family is one of the most powerful commercial computer systems in the world. This is a great opportunity to gain extensive experience of such systems. Opportunities also exist for career progression into software design at the Cumberland facility.

For those who prefer the faster pace of the city, our Cumberland facility is an ideal location and can be easily reached from Edinburgh in 35 minutes, Glasgow in 20 minutes and the historic town of Stirling in 15 minutes. A more relaxed life-style can be enjoyed in the rural areas surrounding the plant. The town of Cumberland itself offers a wide range of amenities.

For details phone 02367 31529 (reversing charges) or write to the Graduate Recruitment Manager, Burroughs, Cumberland G88 0BN.

Burroughs

(3847)

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MICROS BERKS. Software Engineers (One Group Leader) with in-depth knowledge of the application of real-time operating systems using micros needed by UK market leader in environmental controls. Location is in Berkshire. to £12K	PROCESS CONTROL Programmers and Analysts with 3+ years' mini or micro Assembler (DEC in particular) experience plus relevant (i.e. scientific) degree required for producer of Industrial Control and Automation Systems. Offices in Herts. £7-10K	CAD S/W ENG. Software Engineers and Designers with experience of technical and CAD software on DEC, Prime or similar equipment required for development work on CAD projects with this East Anglian client. Knowledge of Fortran and Assembler preferred. c£8.5K
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SENIOR PROG HERTS. Senior Programmer required by large IBM and Mini user for newly created technical support role - experience of CICS, DL/I and JSP desirable. Responsibilities include involvement in systems design, standards, etc. Large company benefits apply. c£9K	GERMANY IBM Analysts and Programmers wanted to work on IBM compatible systems at European division of leading Computer Systems Manufacturer. The requirement is for Assembler, TSO, and DB/DC experience. Relocation assistance and excellent benefits package. £12-18K
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Notice is hereby given that the West Sussex County Council wish to accept tenders for the supply of Data Preparation Equipment.

Their appropriate Tender Forms, together with copies of Conditions of Contract and a specification may be obtained on application to the Head of Computing Services, County Treasurer's Department, County Hall, Chichester, West Sussex.

The County Council do not bind themselves to accept the lowest or any tender received.
All tenders should be submitted on the above-mentioned Tender Forms and should be delivered to the County Secretary of the West Sussex County Council at County Hall, Chichester, West Sussex, in a plain sealed envelope or package on or before 12 noon on 28th January 1981. Nothing should appear on the outside of the envelope which would indicate the name of the tenderer. (3890)

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COMPUTER WEEKLY TOPS 94,000

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COMPUTER WEEKLY'S circulation has topped 94,000 making it the highest of any UK computer journal.

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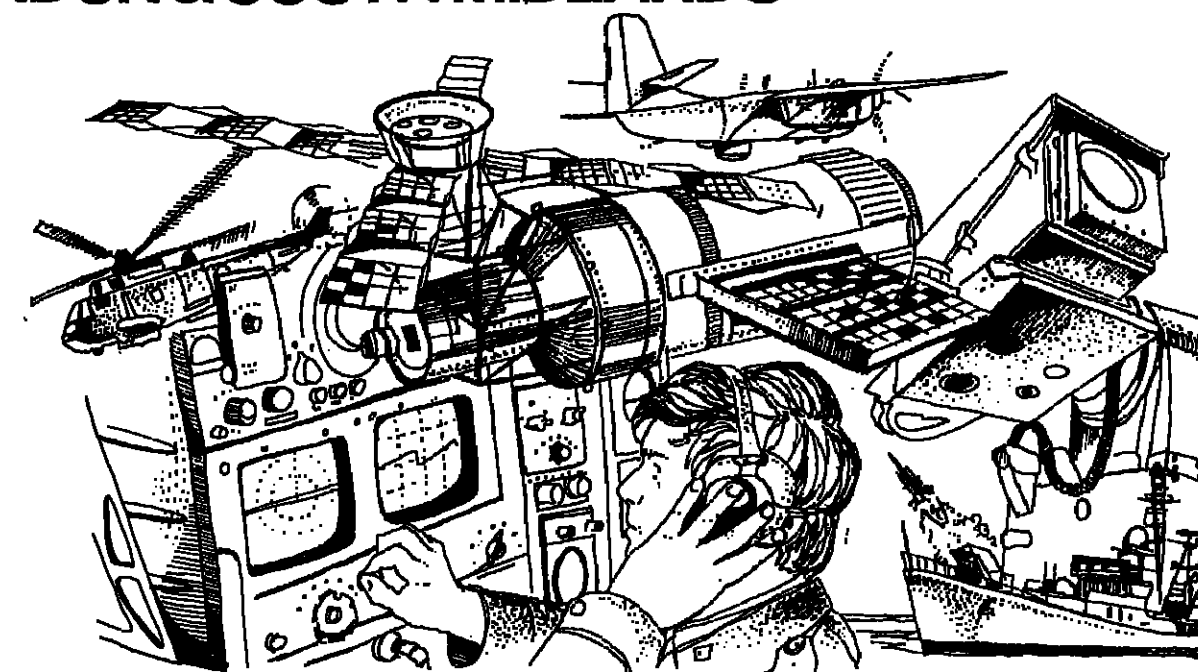
Our clients are the U.K. subsidiary of a well established systems house offering services in the scientific and technical field. They have already opened two major offices close to London and a third is planned early next year with the intention of establishing centres throughout the U.K.

To sell these services they are **not** looking for a technical expert but a high quality sales executive who is a self-starter and also capable of setting up a sales team once success has been established. Experience in the computer industry, software house and/or recruitment consultancies would be an advantage but they would naturally expect you to have an excellent track record.

Our clients are looking for a lot but again the rewards are excellent. Assuming you have the ability you should be able to comfortably earn in excess of £20,000 a year (a basic salary of £8,500 together with good guarantees will be offered). Those earnings will naturally be enhanced by the normal benefits expected with an established organisation.

For further information or to arrange an interview please contact **ROY HIGHFIELD** quoting reference **CW1112**.

(3857)



HUTTON EXECUTIVE SELECTION LTD.
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HUTTON STREET, LONDON EC4Y 8HP

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Hutton
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EDG Engineering International Limited offers a contract to a suitably qualified Systems Analyst wishing to work in Paris. Minimum essential experience will be:

1. 5 years' general computing with 2-3 years' experience in systems analysis and programming for Data General Computers.
2. 3 years' in Real-Time process control.
3. Experience of Port evaluation and software quality assurance.

Preference will be given to applicants with experience in modern telecommunication systems and the offshore oil industry.

EDG Engineering International Limited is an established and important engineering design and management consultancy with global connections in the oil, gas and general process industries. Contract terms offered by the Company will be attractive and will reflect the seniority and responsibility attaching to proposed post.

Please apply by telephone or in writing to:

Steve Rhodes (Present Manager)
EDG ENGINEERING INTERNATIONAL LIMITED
42 Bond Street, Brighton, Sussex BN1 1RD
Telephone (0273) 21911

Targa SENIOR RECRUITMENT CONSULTANT

C £12,000 + CAR

Targa Computer Services, which was established in late 1978, is part of a Recruitment group of companies. We are currently looking for 2 Senior Recruitment Consultants to expand and develop further the recruitment services for the Senior appointments of the computing industry.

Ideally you should be over 25 with at least 3 years' computer experience, to include either Systems Analysis or Programming knowledge. You should have the ability to advise clients on salary levels; job identification and specification; and advertising, thereby compiling a client profile for suitable applicants. Additionally, you must be able to assess people and to advise them on their career development.

We offer a substantial benefits package including a basic salary up to £5000 plus an excellent commission structure, which is guaranteed for the first 3 months. There are also two incentive bonus schemes plus a company car after 6 months.

Please contact M. Dauncey on 01-439 1856 or alternatively send him your detailed C.V.

TARGA COMPUTER SERVICES
48/47 LONDON WALL, LONDON EC2M 5TE

(3058)

MCS

Management Control Systems

The established independent software and systems company need experienced people to work on the specification and development of on-line commercial systems, particularly in the areas of Distribution and Manufacturing.

You will be working in pleasant offices at Ealing, where we have our own PDP11 machine dedicated to development.

You will also be eligible for car options, profit share and pension scheme operated by the company.

Analyst/Programmer UP TO £10,000

Age 26+. Minimum of 3 years' experience in on-line commercial data processing including Applications Analysis and Programming, using Basic preferably on DEC PDP11 computers.

Programmer UP TO £8,500

A minimum of 1 year's experience is required on PDP11 hardware, RSTS and Basic Plus.

Please write with your CV to:

Management Control Systems

4th Floor, Bilton House, 54/56 Uxbridge Road, Ealing, London W5 2TJ.
Or telephone (reverse charge) 01-840 3292

ZYNAR

A new venture company

ZYNAR is dedicated to exploiting VLSI at the silicon systems level. The founders of ZYNAR were responsible for several world-famous microcomputer products and intend to repeat these successes at the silicon systems level. ZYNAR is expanding rapidly and is recruiting critical skills.

Positioned for future leadership

ZYNAR has chosen to participate in four major growth areas:

- Local computer networks.
- Systems configuration technology.
- Silicon systems software for the 1980's.
- Selected innovative OEM products.

Its first product, the Nestar local microcomputer network, clearly demonstrates this innovative approach. ZYNAR will be undertaking business operations in both Europe and the USA. A development group will be established in Palo Alto, California, with Nestar Systems Inc.

Career Opportunities

- Software Engineers
- Hardware Engineers
- Systems Engineers
- Marketing & Sales

If you have experience and enthusiasm for microcomputer systems, networks, innovative software and an ability to be entrepreneurial, together with operating in a worldwide market, please contact:

Colin Crook, Uxbridge (0896) 69831 or alternatively send c.v. to Zynar Limited, 122 High Street, Uxbridge UB8 1JT.

(ZYNAR is a subsidiary of The Rank Organisation)

(3819)

MYRIAD

COMMUNICATIONS ENGINEERS

PABX RADIO FACSIMILE DATA
PRIVATE NETWORKS ELECTRONIC OFFICE

HAMMERSMITH

c.£9500

We are seeking additional Communications Engineers to join an in-house team providing technical support for total communications systems covering the U.K., Europe, the Middle East, and trans-Atlantic links. The company is a major petrochemical and energy resource engineering organisation operating world-wide with an impressive history of success and expansion.

The persons appointed will be involved in the implementation and support of the following systems: Large-scale Data Networks, Message Switching, Electronic Office, Private Telephone Exchanges, Call Logging, Facsimile Transmission, Paging, Mobile Radio, Point-to-Point Radio, Private Voice.

This will include involvement in: negotiation with vendors, clients and PTTs; system and equipment evaluation; first and second level system maintenance; preparation of implementation and maintenance schedules; ongoing contact with users.

If this is the type of role which interests you and you have relevant experience in any of the technical areas mentioned above then we shall be pleased to discuss these positions with you in detail. Telephone, or write quoting reference SW2/1112/CW.

MYRIAD APPOINTMENTS LIMITED
30 Fleet Street London EC4Y 1AA Telephone 01-353 0981 24 hours

(3864)



APL PROGRAMMER

The International Air Transport Association (IATA) has an immediate vacancy for an APL Programmer in its Geneva, Switzerland office.

Position: The successful candidate will become a member of a project team which is currently developing the "IATA Statistical Information System" on a Prime-550 computer. The development of this system will eventually consist of numerous statistical data collections relevant to the aviation industry.

- Main Tasks:**
- integration of these data collections into the system
 - participation in the development of a data retrieval/manipulation language
 - development of tailor-made programs according to user specifications

- Qualifications:**
- B.S. in Computer Science, statistics, mathematics or equivalent diploma
 - 2-3 years' APL programming experience, preferably in a commercial environment
 - fluency in English

Detailed Curriculum Vitae should be forwarded to:
Manager, Personnel
IATA
P.O. Box 180
1216 Cointrin, Geneva, Switzerland

SOFTWARE ENGINEERS

We have vacancies for enthusiastic and experienced electronic engineers, who specialise in software system design and programming of microprocessors, in particular 8080 family. A familiarity with higher level languages such as Fortran, ART, PL/M would be a great advantage. The envisaged work ranges from 8080 software development to use of PD11/34 + INTELLECT system for image processing.

W. Vinton Ltd., a company with a long standing reputation in Television Studio Equipment and Aerial Reconnaissance Systems, has entered the field of Electro Optics by launching new products. The present work includes development and manufacture of Servo Systems for television studio equipment and aerial reconnaissance cameras, electronic speckle pattern interferometry, TV frame Stores, Computer Interfaces, Robotics, etc.

Should you be interested in joining our expanding Electronics Department at a competitive salary, please apply in writing (with full C.V.) to:-
Dr. B. M. Watrasiewicz, Chief Executive, Electro-Optics Division, W. Vinton Ltd., Western Way, Bury St, Edmunds, Suffolk, IP33 3TB.

(3862)

COMPUTER WEEKLY

CHRISTMAS PUBLISHING ARRANGEMENTS

The next issue of Computer Weekly will be published on January 1, 1981, and all copy for classified advertisements should be received by 10 a.m. Tuesday, December 23.

COMPUTER WEEKLY
Quadrant House, The Quadrant, Sutton
Surrey SM2 5AS
Tel. 01-661 0121

CALMA

INTERACTIVE GRAPHIC SYSTEMS

CALMA is an American-based computer company, specialising in producing computer systems for design applications. We are expanding rapidly and require the following staff:

1) HARDWARE TECHNICAL SUPPORT ENGINEERS

Applicants should possess several years' experience as Computer Field Service Engineers. Experience with minicomputers or plotting equipment would be particularly relevant. The successful applicants are likely to be highly competent, technical people, capable of working from own initiative, and willing to travel extensively throughout Europe. c. £10,000 p.a. + car.

2) HARDWARE TRAINING INSTRUCTOR

Required to set up a training department from scratch. Successful applicant is likely to be already employed in this capacity, and have extensive computer experience. Applicants should also be good communicators, and be capable of planning training for a diverse range of products. c. £10,000 p.a. + car.

Conditions of employment will reflect the high grade of people being sought, and will be very competitive.

Please write to the first instance to:
Calma Company, Neville House, 69 Eden Street
Kingston-upon-Thames, Surrey.

(3863)

COMPUTER ENGINEER

£8,000 + Car
Install new small and disk and associated equipment. Customer training. HNC or graduate with experience.
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ELECTRIC ENGINEERS - COMPUTER SERVICE ENGINEERS

NC PROGRAMMERS
£6,000-£16,000 throughout UK
MANCHESTER 061-632 6909

(3861)

MONTECH TECHNICAL STAFF LTD.

DP Team to set up a

New Management Information System

To cope with the increasing Management Information requirements brought about by company expansion an engineering company situated in the North of London is establishing a new department. The new system will cover such functions as stock control, sales information, budget labour control, production, purchasing and accounting. There will, therefore, be considerable scope for suitably qualified men and women, with good business systems experience. Immediate requirements are for:-

Systems Analysts

Senior Analysts and Analysts are required with sound experience of manufacturing and production techniques and finance. Administrative ability is essential, particularly for the senior positions, and a knowledge of COBOL is desirable.

Austin Knight Advertising

Programmers

Senior Programmers and Programmers are required with experience preferably in a MIS environment using COBOL. Experience of CIMCOM's TOTAL database management systems would be desirable. Applicants without TOTAL and COBOL experience will be considered, as training can be given.

All positions carry attractive salaries and benefits including assistance with relocation, where appropriate.

Write with details of experience to Position Number AMD 8086, Austin Knight Limited, London W1A 1DS.

Applications are forwarded to the client concerned therefore companies in which you are not interested should be listed in a covering letter to the Position Number Supervisor.



Second Advertisement

Computer Manager

Cardiff c. £10,000

This challenging post is created by the installation of a Honeywell L64/DPS2 in the Membership Records Department of the Royal College of Nursing. The College is both the professional organisation and trade union for nurses, with a current membership in excess of 170,000 and growing. Computerisation of membership records and subscriptions is the initial and major task, to be followed by the provision of an in-house service to other departments of the College. The computer will use a network of terminals in Cardiff and London and candidates should have a sound knowledge of communications and database techniques.

Whilst salary and conditions of employment are good it is regretted that assistance with relocation costs cannot be given.

Rcn

Royal College of Nursing

For further details and an application form telephone or write to the Personnel Officer, The Royal College of Nursing, Henrietta Place, London W1M 0AB. Tel: 01-580 2646.



communications

Travicom 2

The Travicom System is the world's foremost multiple access airline reservations, ticketing and accounting system. Some 500 United Kingdom travel agents already have direct visual display connection to the seat-booking processors of 20 leading international airlines for these purposes.

The Travicom 2 System now being developed at Maidenhead will retain the world lead by increasing several-fold the power available for message switching and translation. It will operate with Packet Switched Services or with Dedicated Data Networks and will extend the range of services to include package tour, hotel, car rental, sea ferry and rail booking, ticketing and accounting.

KLM have chosen the Travicom 2 System for use throughout Holland. Other airlines and telecommunications authorities are about to do so for their countries.

If you are an experienced programmer or software engineer familiar with any of the following:

- * DEC or Zilog hardware
- * RSX-11 operating systems
- * Corel, Assembler or Micro-Cobol language
- * Data Communications, Accounting or Commercial systems

and are interested in joining an expanding and exciting project with opportunities to travel and work abroad please contact us for more information.

Telephone Personnel Department, Maidenhead (0628) 71611, Ext. 42, or write to Computer Communications Limited, Fleming House, King Street, Maidenhead, Berkshire SL6 1DU.

(3771)

7K FOR 3 MONTHS TAX FREE

Programmers up to £600 per week Tax Free
Three months' intensive contract in Saudi Arabia. You will need four years' experience on ICL 2900 series with COBOL under executive, plus George II. All fares, food, accommodation free.
For further information contact:
01-439 8251
AIDGRADE LTD.

BOX Nos.

Box number replies should be addressed to:

Box No. 274 Computer Weekly
Barnet House
Barnet Street
London N11 1LU

datascene

RPG II PROGRAMMERS

LONDON CITY to £8,000

A well-established software house specialising in insurance and banking systems are recruiting RPG II Programmers. You should have at least 18 months' experience preferably with IBM hardware and gained within a financial environment. Client contact is expected and applicants will be dealing with management at all levels. These positions offer excellent scope for capable programmers who wish to enhance their careers by utilising the latest IBM software and in-house developed database systems.

RPG II ANALYST PROGRAMMERS

LONDON CITY, IBM SYS. 32,34,38 to £10,000

An excellent opportunity has arisen for experienced Analyst Programmers to progress into consultancy. Ideally you will have at least three years' IBM RPG II experience, one of which will revolve around banking and insurance projects and will include database, communications and financial planning and modelling. Applicants must be of smart appearance and have been educated to A level standard. An excellent benefit package is offered and futuristically will include a car.

ANALYST/PROGRAMMERS

E. HANTS ICL ME29 to £7,500

Our client is a well-established member of the consumables industry who needs a competent COBOL programmer who can fulfil the role of Analyst Programmer in a small team. Candidates should have not less than 2 years' experience of programming and analysis and should also possess a good business background. A familiarity with TP would be an advantage.

In addition to the salary, the company offers a pension scheme and staff sales.

COBOL PROGRAMMERS

N. KENT IBM 4341 c. £7,500

A member of the Underwriting, profession urgently requires programmers to lead them into their new generation of machinery.

Having recently upgraded the hardware, their need is now for programmers with two or more years' experience in COBOL which must have included a familiarity with C.I.C.S.

Additional benefits include a bonus (c.17½%) 50p luncheon vouchers, free BUPA and a holiday bonus. D.4614

ASSEMBLER PROGS

CITY IBM 3033 c. £10,000

Assembler Programmers are urgently required by this leader in the assurance profession.

Their installation contains the most recent soft and hardware including MVS, CICS, TAM, VTAM, TSO and ADABAS.

Candidates should have at least two years' MVS experience and be competent assembler programmers. A background of assurance would be an advantage.

All the benefits of this type of business are available, including cheap mortgages. D.4617

SOFTWARE PROGRAMMERS

WEST END. UNIVAC £9-11,000

There are opportunities for experienced and versatile SOFTWARE PROGRAMMERS to join two financial institutions based in the WEST END. UNIVAC 1100 experience is essential including some of the following: ASSEMBLER, CMS, DMS, 1100, RSP, QLP. First-class conditions of employment apply in both cases and include SEASON-TICKET LOANS and MORTGAGE SUBSIDY. A good depth of experience coupled probably with a degree in COMPUTER SCIENCE will be required by successful applicants. R.4678/818

PROGRAMMERS

CITY. BURROUGHS £6-£9,000

A successful City-based computer bureau utilising medium sized BURROUGHS equipment has opportunities for all levels of programmers. Applications are invited from programmers with BURROUGHS, COBOL and ideally DATABASE experience. If this has been gained in a bureau or software house environment so much the better. The chance to develop your experience in a wide range of application areas together with excellent prospects is offered and the company also provides a comprehensive benefits package which includes car parking facilities and season-ticket loan. R.4671

SENIOR PROGRAMMERS

N. SURREY. HEWLETT PACKARD £9-£10,000

A leading consumer foods company require two Senior Programmers to assist with the development of Computer systems following the installation of five HP3000 machines. Applicants should have three to four years' COBOL preferably on Minis with some supervisory experience. Application areas should include either ORDER ENTRY, INVENTORY or FINANCIAL LEDGERS. It is essential that candidates have the ability to ensure good adherence to standards and to motivate staff. A comprehensive range of company benefits is offered. R.4750 (3866)

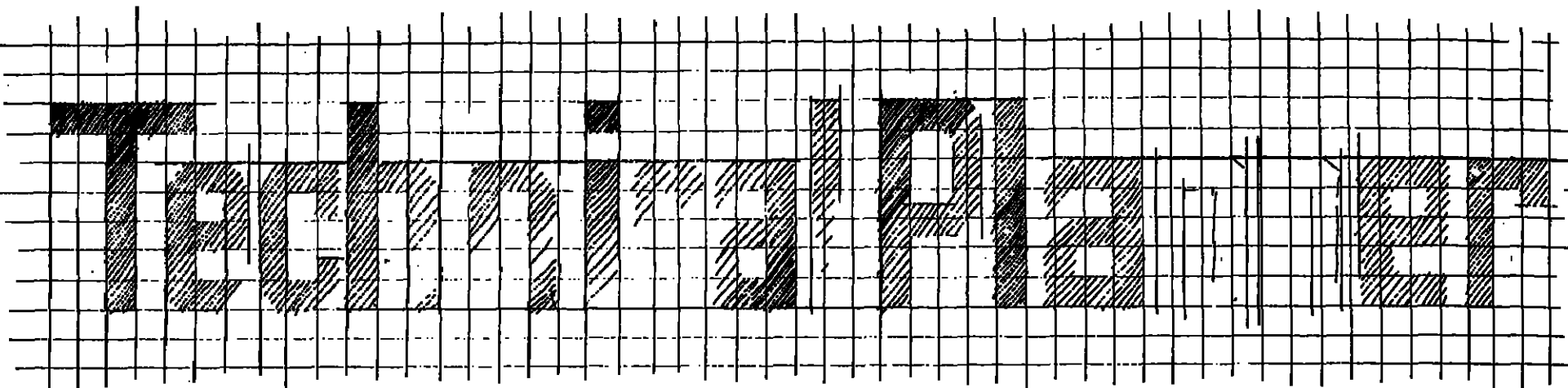
The above vacancies are only a small selection from those currently on our files and we are always delighted to talk to experienced systems and programming staff wishing to further their careers.

Datascene International Limited
Scotney House
168-172 Regent Street
London W1R 7FB. Telex: 25551.

01-439 7871
24 hour answer phone

MANAGEMENT & EXECUTIVE SELECTION

telephone 01-637 9611



to £12,000

Our clients are market leaders in international transportation systems. They are investing in an advanced information systems strategy to support planned future growth.

The technical support group producing and installing this blueprint needs one senior consultant and one more junior specialist. The blueprint will encompass relational data-base, telecommunications, word/text processing, message switching, etc.

Structured applications design and structured programming

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

London

techniques will be adopted and candidates will be involved in their development.

Previous achievement in the above areas would guarantee an immediate interview and clear opportunities for advancement for the successful candidate.

Benefits, commensurate with a large international company include BUPA, four weeks' holiday and salary to £12k.

Plan your future with the Leaders—ring Diane Oubridge on 01-6379611.

MANAGEMENT & EXECUTIVE SELECTION

(3884)

IRISH OPPORTUNITIES FOR 1981

DUBLIN

★ **SENIOR PROGRAMMER** £8-10K
Manufacturing Company require at least 18 months experience of RPG II.

★ **PROGRAMMER/SYSTEMS ANALYST** £8½-9½K
ASSEMBLER experience required for IBM 4341. Mortgage assistance in addition.

★ **SYSTEMS ANALYST** £8½-10K
Experience of Financial and Manufacturing Systems for IBM 4300 installation.

N.B. Any candidates visiting Dublin over Christmas and the New Year considering moving permanently to Ireland should contact: Joyce Hughes or Gerald Delamere. Immediately.

★ **SENIOR SYSTEMS ANALYST** to £11,700 + BONUS
Minimum of 3 years' Commercial Systems experience for ICL 2904 installation.

★ **PROGRAMMER** £7-10K
A Management Consultancy require good RPG II experience.

★ **SYSTEMS ANALYST** CIRCA £11K
Manufacturing Company require 4 years' Systems experience including a COBOL background.

Central Computing Consultants

LONDON: 8A Lower Grosvenor Place, London SW1W 0EN, England. Telephone: 01-834 7105. Telex: 918582

DUBLIN: Canberra House, 24 Lower Leeson Street, Dublin 2. Telephone: 789577 (5 lines)

(3878)

Targa

DATA BASE ADMINISTRATOR to £12,000

A well-known Company, based South of London, require a Data-Base Administrator for their large computer site. The company use IBM 370/158 & 3031 mainframes running under OS/VS1 & MVS respectively. The successful applicant will have extensive knowledge of programming on IBM equipment and currently be at least a SENIOR PROGRAMMER who has good experience of Data-Base Systems. Ref. 3164

ANALYST/PROGRAMMER £6,000

A company based in South London require an Analyst/Programmer who has at least one year's good commercial experience gained in Hewlett Packard machines utilising FORTRAN. The successful applicant will also be required to have an "A" level pass in Mathematics. Very friendly company with pleasant working conditions. Ref. 3170.

TERMINAL OPERATOR £5,500

A City based company have an URGENT REQUIREMENT for an Operator to work on an IBM 8100 (PDP) terminal, which is linked to an IBM 370 mainframe in the USA. The specific requirements for this position are, a good understanding of IBM systems especially DOS/VS, knowledge of RJE and the ability to perform House-Keeping and File-Maintenance procedures. A very easy two shift system is in operation. Ref. 3169.

OPERATORS (Various) £6000

Vacancies exist for all levels of Operator for a Company based South of London who use IBM hardware utilising OS/VS1 & MVS. The current configuration comprises 370/158 & 3031. A standard 3-shift system is in operation. Successful applicants can expect a very good salary and many chances of career progression. Ref. 3162.

PDP11/70 SHIFT LEADER, S. LONDON £HIGH-NEG.

Our client a large well known concern in S. LONDON is currently looking for an experienced OPERATOR or SEN/OPERATOR with at least 2 years' plus current experience using a PDP11/70 running under RSX11. You should be of smart appearance, able to demonstrate your supervisory capabilities/skills and be able to motivate staff under you. Benefits for this position are superb, namely, sub. mortgage, NCP, BUPA, L/A, ST/L and LV. Ref. 3165.

ICL SYSTEM 4 OPERATOR, S. LONDON to £6,300

Based in S. LONDON our client is looking for an experienced SYSTEM 4 operator. If you have between 1-4 years' experience on SYS 4 and would like to progress our client would like to hear from you. There are possibilities in the future of moving onto their larger 2900 systems. The company also offer a first-class benefits package. Ref. 2258.

TARGA COMPUTER SERVICES

46/47 LONDON WALL

LONDON EC2M 5TE 01-638 6381

24-HOUR ANSWER

Australia

CONTRACT AND PERMANENT POSITIONS

The current high level of demand for experienced people in the computer industry has resulted in many vacancies with Companies throughout Australia.

We are one of Australia's leading Executive Recruitment Consultants and are assisting a number of companies in locating suitable applicants for positions in most Australian states.

Immediate vacancies exist for people with a minimum of 3 years' D.P. experience:

DATA PROCESSING MANAGERS
PROJECT MANAGERS/LEADERS
DATABASE SUPERVISORS
SYSTEMS ANALYSTS
PROGRAMMERS

Salaries and conditions of employment are negotiable in line with ability, experience and the locations of the positions. Full details of all positions and conditions of employment will be made available at interview.

Send a detailed résumé of your education and experience and your contact telephone number, or obtain an application form from our agent in London, Mr. Norman Buckley, Metrics Research, 97b Drayton Gardens, London, S.W.10. Telephone: 01-373 9077.



Chandler & Macleod Consultants Pty Ltd

(3885)

Lead Programmer
Permanent or Contract

Required: several years' application programming experience with detailed knowledge of WANG 2200, preferably MVP, and fluent business systems experience of PDP 11, IBM 3100 type or advantageous. Job: software support and development of commercial and accounting packages marketed to a wide variety of users.

London City of London. Salary/Contract rate commensurate with experience.

Overseas: Bernard Taylor, 01-388 9050, Fraser Williams (London) Ltd., 38 Warren Road, London W7.

THE UNIVERSITY OF SHEFFIELD
DEPARTMENT OF COMPUTER SCIENCE
Applications are invited for a post of
PART-TIME PROGRAMMER

for Computer Awareness courses mounted for the above department. The person appointed will serve mainly as a practical demonstrator for BASIC programming courses for beginners, and will also do administrative work in support of these courses. Initial salary in range £2,395-£2,530 a year, rising to £2,495 (see rate table on back) or Other Related Staff. Particulars from the Registrar and Secretary, The University, Sheffield S10 2TN to whom applications should be sent by 8 January, 1981.

Quote Ref. R530/BB (3870)

SYSTEMS PROGRAMMING MANAGER

£12,000+

Applications should have about 10-12 years' experience as a technical IBM environment with good supervisory skills to lead a team. The company uses an IBM 3031 & DEC 20 computers. Experience of MVS, JES and ISD essential.

SYSTEMS PROGRAMMERS To £10,800

Croydon
The company has a medium sized installation using IBM hardware under VM/370 and DOS/VS with CICS/VS and DL/I. If you have at least 2 years' relevant experience for this Croydon job or any other preferred location, we would like to hear from you.

SYSTEMS ANALYSTS £7,000-£9,000

Various companies are seeking Systems Analysts with 18 months to 3 years' systems analysis experience.

Locations: BRIGHTON, STAMORE, CAMBERLEY, BRENTFORD, WATERLOO, REFINI, CROFTON, TUNBRIDGE WELLS, KINGS TON, SLOUGH, ALPERTON, SOUTHALL, WEST END, BECKENHAM and BOREHAMWOOD.

PROGRAMMERS £ Various

Junior and Senior Programmers are also required in various areas. Please phone for an Application Form or write, giving FULL details.

AMES PERSONNEL

Employment Agency Suite 14, Dryden Chambers, 119 Oxford Street, London W1R 0PA Tel: 01 434 1107

Telecommunication Systems Development Up to £10,000

For people with at least 4 years experience in computing and an interest in developing such current technology as micro-computer data capture in the implementation and design of highly sophisticated telecommunication networks, Ladbroke Racing have got exactly what you're looking for.

They are looking for someone with proven computing ability and knowledge of telecommunication network design to help them in the design and development of highly advanced, original technologies relating to telecommunications and data capture.

The work is stimulating, remuneration and benefits excellent and career prospects are outstanding.

If you have what it takes and can liaise competently with all levels of management, Ladbroke Racing would like you to contact them.

Just write to Mrs. Marjorie Cobban, Ladbroke Racing Ltd., Hanover House, Lyon Road, Harrow, Middx.

➔ Ladbroke's

Freelance Programmers & Analysts

Plan your next project now!

We need reliable professional people to work on interesting contracts in London and the Home Counties.

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★ COBOL DOS/VS CICS (Dec, Jan, Feb)
★ COBOL D. G. Eclipse (Dec)
★ PL/1 DL/1 CICS (Jan, Feb)
★ BUSINESS ANALYSTS (Dec, Mar)
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Contact us now and reap the benefits of working for a Software House.

Ring: Sheila Fox or Paul Hill
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THE SALES BIT

Starting a job in management

SO there you are, bright and early, sitting behind an empty desk in your new and unfamiliar office, wondering if you have done the right thing. All those colleagues, allies, enemies, characters that took so long to get to know, now left behind in the cause of personal career development. Outside the door an army of strangers waiting to put you to the test.

The role of new management arrival is a difficult part to play. For a start you hardly know any of the rules of the game. Okay, you've got a job specification (if you really got lucky!) and they told you at the interview what was expected of you.

You probably know the market, the industry and the job function; otherwise it's unlikely you would have been appointed.

The product? Well, that's something else. Chances are your knowledge is fairly superficial, a general appreciation gained as a competitor, and your subordinates will almost certainly start the game as your technical superior.

Vulnerable

Yet you have an area of even greater vulnerability, a total ignorance of the people who work with and for you and the functioning of the company's political mechanism... the unwritten rules, the operation idiosyncrasies, the way things have always been done until now, the strengths and weaknesses of individuals, the fetishes, the troublemakers, the placators, the naive, the mentors, the leaders, the followers, the aspirants and the failures. Like as not you'll have a complete set working for you.

All you have to do is sort out which is which. The problem of maintaining personal credibility while sorting out the morass of operational habits and individual personalities should not be underrated. It is a considerable and unavoidable task; a nettle that every new manager has to grasp. Surprisingly, to me at least, many managers cannot perceive this view of the circumstances or see that there is any need to do anything other than "start as you mean to go on". For them the "new broom" syndrome is the opti-

mum approach; sensitivity is anathema.

Well, that philosophy may be all right for autocratic bridgebuilders, but it doesn't do a lot for the long-term survival of the manager or his subordinates.

Ruthless

The main disadvantage of leaping into action soon after arrival is that one inevitably knows so without all the facts. One can easily confuse logic with the way things really are.

To draw conclusions in the first days or even months is to attempt to solve a partly stated problem with a small proportion of all the factors involved.

Of course, there is a time in the life of all managers for acting in a ruthlessly objective manner. It is the responsibility of every manager to make business decisions that are devoid of sentiment. He must be able to tackle the "Gordian Knot" in the time-honoured manner; but only when the time is right. There is only one right time and that is when one has fluency in all the factors involved; seldom an overnight process.

Guideline

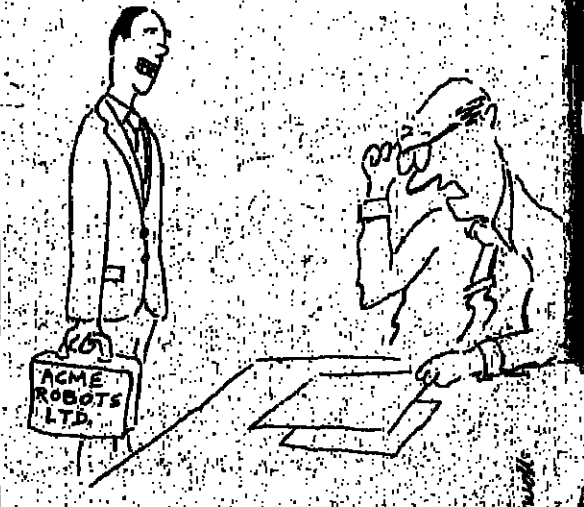
If there's an 80/20% rule for starting a new management job it is likely to state that one can learn 80% of what a company is about in the first 20 months and with a bit of luck the next 80 months will reveal the remaining 20%.

There's an old Yorkshire saying "Hear all, say nowt!". That's not a bad guideline either.

TRADER

Puzzle Answer

	1	4		
2	6	7	11	
5	10	3	8	
	9	12		



"Are you the salesman - or the product?"

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An exclusive opportunity to pioneer in the most advanced recruitment medium of the 80's

We invite you to join us in pioneering what may well be the biggest breakthrough in computer recruitment history.

IPC Electrical-Electronic Press Ltd. have launched a Prestel Viewdata appointments service for computer personnel — the first of its kind — and Computer Weekly advertisers are being given an exclusive opportunity to use it.

For just £75 extra, any position advertised in Computer Weekly will also be announced on Prestel screens for five days. The screen announcements will contain the main details given in the Computer Weekly advertisement. And this special computer appointments service will have its own key access number on Prestel.

The Prestel information service is now available in public libraries, universities and computer centres across the country — and many key computer personnel are already regular users. Your advertisement will be telecast on Prestel the day we receive it — up to six days before it appears in Computer Weekly itself — which could enormously increase the speed of response as well as the number of replies.

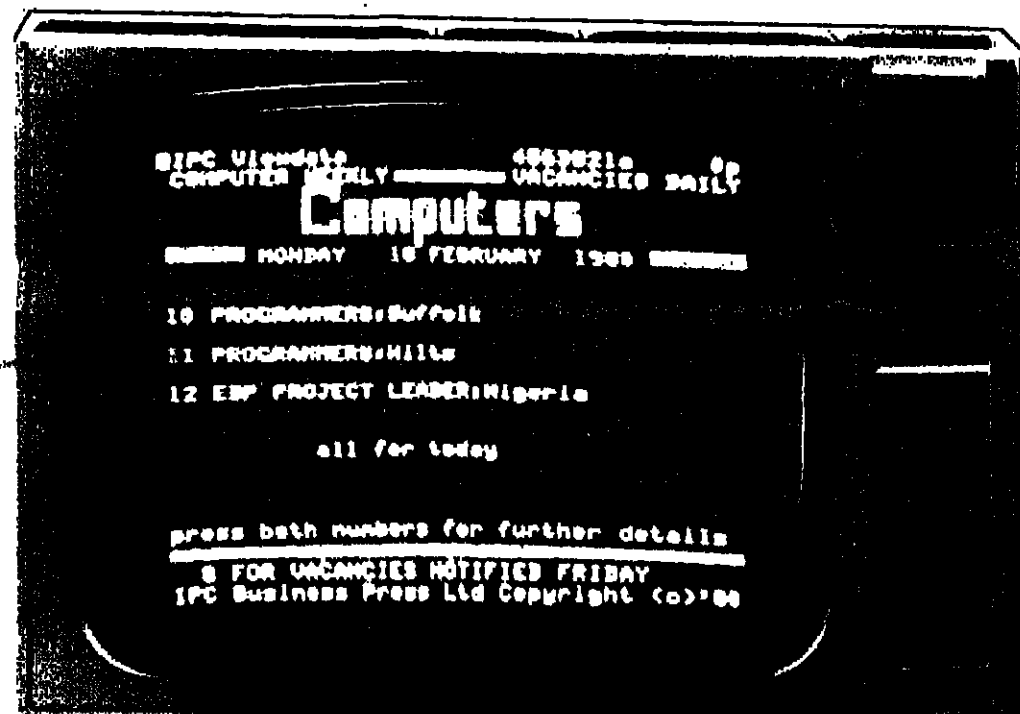
Start your 1980s recruitment programme by harnessing the key information medium of the new decade. Contact Brian Durrant, Classified Advertisement Manager, IPC Electrical-Electronic Press Ltd., Quadrant House, The Quadrant, Sutton, Surrey, SM2 5AS. Tel: 01-661 3106.

COMPUTER WEEKLY

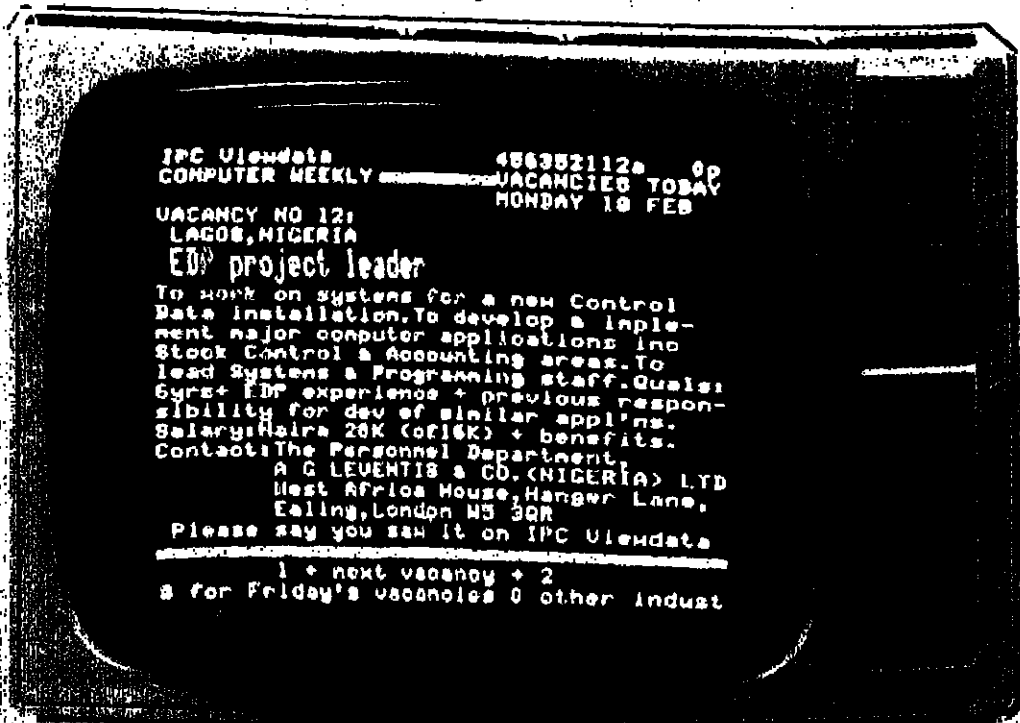
in association with IPC Viewdata

Note: A parallel service is available to Electronics Weekly recruitment advertisers.

HOW IT WORKS



On dialling the computer appointments number, applicants are immediately informed what jobs are available for the day, and given a key number for each. They can also obtain details of the previous four days' vacancies, so that each job is in effect on offer for a working week, at a cost to the advertiser of only £15 per day.



On pressing the specific job's key number, applicants are given full details of the vacancy (if there's room), all the details that you have given in your appointment ad including how, where and when to apply. This amounts to a 5-day recruitment campaign, screened to a highly select audience.

KUWAIT — MINI ENGINEER

c. £12,000 Tax Free + Benefits

A substantial Danish group has a well established computer services operation working in Kuwait and expansion has created the need for a further computer field engineer to be responsible for equipment servicing throughout the country. Installations comprise DEC PDP 11 and Systime CPU's, with CDC disc units and Tektronic/Calcomp graphic display units.

The company provides business computer systems, software consultancy and computer based telephone systems. Experienced engineers with a sound background of servicing these types of hardware will find this an exceptional opportunity to join an effective and expanding European group.

An attractive salary is offered for the area together with a comprehensive benefits package including car allowance, return air fares to home country for 1 month's holiday and free furnished, air conditioned accommodation. The appointment is initially for two years with 4 weeks bonus on completion and the option to continue.

The requirement is urgent and interviews will be conducted in the U.K. week commencing 16th December 1980.

Engineers having relevant experience should telephone immediately to discuss the requirement and how to apply. Either single or married status is acceptable. Please quote reference CW 164-C.

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Data Control Supervisor

£6,275-£7349 + Metropolitan weighting — Enfield

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Responsible for the day to day running of one of two Sections under the direction of the Data Control Officer, he/she will be mature and sufficiently experienced to be able to organise the daily batch work flow and re-runs, ensure training schedules are implemented and processed and that sections are manned adequately.

To qualify for this responsible position applicants should have a knowledge of 1900/2800's, at least four year's relevant Data Control experience, two of which must have been in a supervisory capacity. There are definite career opportunities for someone who can learn quickly and is excited at the prospect of working on new machines and advanced systems.

Salary offered is in the range of £6,275 — £7,349 + £536 p.a. metropolitan weighting and a range of generous benefits, including subsidised staff restaurant, pension and sick pay schemes, etc.

For an early interview
please contact:
The Personnel Department,
Eastern Gas,
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Tel: 01-366 1234.

EASTERN GAS

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Our client is an established supplier of quality real-time and other computer bureau services to several blue chip organisations.

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A major enhancement of the twin CPU's together with a significant expansion of the intelligent terminal network will give further opportunity for the group (of four people) to develop their skills and give full job satisfaction.

If you have substantial system software experience (perhaps five years or more) and are seeking a technical challenge in a company that provides significant benefits in addition to salary, and has offices in an interesting part of Central London close to tubes and with easy access to mainline stations, then ring us, in confidence, quoting reference 315. (Messages will be recorded after hours.)



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